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The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

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BRIEFLY TOLD.

NOTES.—

THE executive management of the Greeley Gas Company, formed for the purpose of supplying gas to the residents of Greeley, Col., is as appended: President, George R. Pogue; First Vice-President, C. H. Ramsay; Second Vice-President, M. A. Bunker; Treasurer, A. A. Miller; Secy. and Gen. Supt., George J. Spear.

MUCH interest attaches to the decision of Judge Grosscup, of Chicago, respecting the real initial try over the legality of the city ordinance directing that the Peoples Gas Light and Coke Company, of Chicago, shall not charge its patrons a rate in excess of $1 per 1,000 cubic feet. The proprietors of the Company applied for an injunction to restrain the city from enforcing the ordinance, and the city interposed a demurrer. The case was argued some time ago, and the Grosscup decision is in effect to sustain the demurrer, the main basis for the sustaining being the declaring that the initial court had no jurisdiction in the premises. The case will be appealed to the Supreme Court of the United States, the Company to give a bond for $600,000 as a safeguard for damages that may accrue pending and during the appeal. We have only a skeleton of the decision, but we shall print it in full when the completed account comes to hand. We understand the court held, in a side sort of way, that the rate named per 1,000 could not in any sense be held as confiscatory of the Company's trading.

HIGHLY satisfactory results have attended and followed the lessons in gas cooking that have been given in Troy, N. Y., under the auspices of the Gas Appliance Company, of America. The lessons, which were given in a well-located and thoroughly equipped shop for the purpose (No. 456 Fulton street), were begun the evening of July 26th, and we understand they will be continued well into the present month. Of course, the Troy Gas Company is behind the Gas Appliance Company in this service.

THE Gas Workers' Union, of San Francisco, have served notice on the several gas companies of that city that, from a certain date to be named hereafter, their working time shall be cut to 8 hours per day, the rate of pay for that service to be at least equal to the wage now received for 12 hours of work. The demand seems ridiculously unreasonable, and it is possible that the men will later on see it in that light. One of the "Workers" named Gill, in speaking to a local reporter over the "questions" at issue, said—he is an employee of the Pacific Gas Improvement Company: "We are contented with the prices paid by the Company, but we want 8 hours to constitute a day instead of 12. The Union is prepared to make a strong fight, and believes that its members will quit in a body if the demands are not met. The workers are the only sufferers from the gas war, and we believe that by maintaining our ground we can force the companies to come to an understanding and put gas at such a price as will permit them to meet our request for an even grade of pay and shorter hours." There is quite more than a grain of sense in the words of "Worker" Gill's last sentence; for certainly no one can justify the idiotic gas rate war that, conceived in personal animosity by a capitalist whose bank accounts are seemingly larger than his possession of common sense, has been waged there for months. Think of the utility of it from a commercial point of view; gas in San Francisco at 50 cents per 1,000 cubic feet!

LIBRARY OF CONGRESS
AUG 4 1902

A PETITION has been lodged with the authorities of the town of Niagara Falls, Ont., protesting against the granting of a franchise for the supply of gas in that place to the Niagara Falls (N. Y.) Gas and Electric Light Company. Our informant says that the protest is liable to be favorably considered.

A SPECIAL meeting of the shareholders in the Fargo (N. Dak.) Gas and Electric Company has been called by the President, Mr. Wm. Mainland, for the purpose of considering the advisability of selling and disposing of the property. The meeting will be held on the 7th inst.

MESSRS. N. T. MEGINNISS and Joseph W. Clarke have been temporarily re-elected to the positions heretofore held by them in the Consolidated Gas Company, of Baltimore, Md.; the former as Secretary, the latter as Treasurer.

THERE is a new proposition before the Council of Sisterville, West Va., for the establishment there of a gas works. Our informant adds that the "authorities are disposed to act favorably in regard to the application."

THE properties of the Sioux City (Neb.) Gas and Electric Company have not yet been acquired by the interests which have acquired the plant and who are now in control of the Sioux City Traction Company. The negotiations, however, tending to that end are still underway.

RECENT press dispatches are to the effect that Judge Henry C. Ryan, of the Superior Court of Indiana, has rendered a decision in the case of the Enterprise Natural Gas Company, of Newcastle, Ind., against the Richmond (Ind.) Natural Gas Company, that is of great importance. The suit was brought to restrain defendant from operating a gas pumping station in the limits of Newcastle. The meat of the decision is that the defendant is a trespasser on the property of plaintiff, and has no right to use artificial means that tend to deplete the supply of gas that normally belongs to the Newcastle district. A perpetual injunction was granted in restraint of the Richmond Company. An appeal to the Supreme Court will be made.

THE Board of Trustees, of the village of Clyde, N. Y., have revoked the franchise granted in 1898 to the Clyde Gas and Electric Company, owing to the failure of the latter to furnish a bond in the sum of $5,000, which bond was directed to be filed by the terms of the grant.

A FEATURE of "Carnival Week" in Mankato, Minn., was the beauty of the illuminations on public account furnished by the Mankato Gas and Electric Company.

Prepayment Meter Law in England.

The *Journal of Gas Lighting* reports that a case with reference to the custody of prepayment meters, of a somewhat, though not quite, similar character to two which were a few weeks ago decided at Longton and Chester, came last week before the Magistrates at Newport (Mon.). A consumer left his house, and thereafter the money he had placed in the prepayment meter was stolen. It was not denied that the gas had been consumed; the only question to be decided being, who should bear the loss of the money taken? As in the two previous cases, the consumer was made responsible, and has thus to pay a second time for his gas. This may seem hard on him; but then someone had to suffer, and that the liability has been laid upon the right shoulders can hardly be doubted.

As one of the local papers remarks, the meter was on the consumer's premises, and he was the custodian of it and its contents. It was not sufficient for him to put pennies in the slot; he had to keep the money in safety, and to give the Company the opportunity to take away what was lawfully theirs. This however he failed to do. The writer remarks that, if the Bench had given any other decision than they did, it would have opened the door to the dishonest; to make the consumer responsible for the meter and its contents is at once common sense and justice.

With this expression of opinion we entirely agree, and we are pleased to see a newspaper take so unprejudiced a view of a gas company's claim. It is the duty of prepayment consumers to give due notice to the gas supplying authority of their intention to vacate their premises; and this is a course which is generally, if not always, insisted upon in the agreements such consumers are customarily called upon to sign.

Effect of Holidays and Illuminations on Gas Consumption.[1]

There is much ignorance abroad as to the actual effect that public illuminations have on the consumption of gas. We find evidence of it in the Press, among lay acquaintances, and even among some of the gentry of the Stock Exchanges, who appear to be credited with a supernatural power of penetration, and so able to forecast the result of the movements of men and things. Only a few days since, a financial writer in a daily newspaper attributed the fact that there had not been a setback of certain gas stocks in view of the postponement of the Coronation illuminations to the belief that was current that the benefit which would accrue therefrom had only been briefly deferred. Of course, this public ignorance is not shared by any connected with the management of gas undertakings who had experience of the illuminations at the time of the jubilee and diamond jubilee of Her Majesty the late Queen. Mr. Henry Woodall, writing with his experience to support him, recently stated in the *Journal* that he expected the Coronation illuminations would not lead to an abnormally large demand for gas. "I shall," he added, "be greatly surprised if in towns of any size—and London more particularly—the demand exceeds that of a Sunday. These illuminations are very imposing in main thoroughfares and particular centers; but they hardly compensate for thousands of houses left tenantless and dark."

Mr. Woodall here hit the mark; and so far as a test has been applied, his prognostication has been fulfilled. But, in addition to the numberless dwelling houses left "tenantless and dark," the recent double bank holiday (although the Coronation is not yet, through the regrettable circumstance of the King's illness) accounted, all arrangements having been made, for the closing of most large manufactories and business premises during the latter half of the week ending on June 29; and this would represent a not inconsiderable decline in the day gas consumption. Then, again, temperature, as Mr. W. Doig Gibb reminds us in a personal letter (accompanying some figures with which he has favored us) plays a not unimportant part in the returns; and, on the day of the illuminations in Newcastle this year, the temperature was 84°, as compared with 59° this time last year. But the fact that he obtained an increased consumption on the day of the higher temperature (with the illuminations) as compared with the corresponding day last year which was colder and without illuminations, shows that the circumstances of the corresponding day of last year were not normal. Newcastle, in fact, is not a fair guide, as the week with which we are particularly dealing is "race" week there; and it is the principal holiday in the year of the local workmen. It goes without question, however, that temperature would have its effect on the station meter records; and, in London, on June 27 and 28 the days were dry and hot. Furthermore, in considering the effect of the illuminations upon gas consumption, the increasing use of electricity for the purpose has to be taken into the reckoning; and the streets of London bear evidence of a very considerable adoption for illuminative decoration. These are all factors of which the layman has little or no knowledge, and therefore does not make allowance for when he asseverates, with all the assurance of a vain pretender, that the "illuminations will be a fine thing for the gas companies, and will make the wheels of the meter recording mechanism spin around." Of such is the writer in the *Pall Mall Gazette*, who said on June 28: "One may gather some idea of the extent to which Coronation preparations had been made by observing the reservoirs [*sic*] at the different gas works around London—at Battersea, Kensington, Blackwall and elsewhere. They all stand at a high level of inflation, and instead of working at extra pressure, as intended, the staffs are at present comparatively idle. A maximum reserve of gas is inadvisable at this season of the year; and it will be steadily worked down unless some general illuminations are projected soon, so as to celebrate the King's recovery." We quote this paragraph as an example of newspaper sapiency on this subject, and for the amusement it will afford readers.

In London there has not, at the time of writing, been a general lighting up of the illumination decorations; but in view of the King's rapid recovery, the projected arrangements for the Coronation rejoicings have been carried out in many places in the Provinces. These have enabled us to obtain a few interesting figures, which conclusively show that, owing to the holidays, and the consequent smaller consumption of gas for business and household purposes, the actual output of gas—illuminations notwithstanding—in all cases but one, was less than on the corresponding dates of last year. Other figures, too, where there

1. *Journal of Gas Lighting.*

were no illuminations disclose a substantial relapse in gas consumption which can only be attributed to two causes—the holidays and the high temperature prevailing. In this latter category, we may take as an example the Gas Light and Coke Company, the figures in regard to which were kindly supplied by Mr. J. W. Field. On Thursday, June 26, the consumption was 36,250,000 cubic feet; and on the following day, it was 34,665,000 cubic feet. The outputs for the corresponding days of last year were 41,454,000 ccbic feet and 41,558,000 cubic feet. The approximation of the figures for the two days of last year show that the consumption was then taking a normal course; while the drop in comparison for the two days this year clearly reveals that there were abnormal causes operating against the consumption. Those causes were produced by the pause in business; and there was no partial compensation from illuminations. It will be interesting, when there is a general illumination of London, if Mr. Field, Mr. Jones and Mr. Carpenter will furnish their returns for publication.

Judging from the figures received, the experience of London has been that of most other cities and towns of importance in the country. Birmingham, which is a striking example, may be taken first. There, as in many other places, the favorable bulletins as to the King's health, decided the authorities to observe with rejoicing the holidays which had been irrevocably preappointed; and the illuminations were carried out with the full splendor arranged for. Although gas was the chief illuminant, Mr. G. Hampton Barber, the Secretary of the Gas Department, informs us that the consumption on June 26 was only 6,791,000 cubic feet, and the next day 6,818,000 cubic feet. The corresponding days' outputs in 1901 were 11,641,000 cubic feet and 11,750,000 cubic feet; so that Birmingham—taking the two days together—exhibits a reduction approaching 10,000,000 cubic feet. Figures, which have Mr. William King's authorization, disclose a like story in regard to Liverpool. The holidays were largely observed so far as work was concerned; but we believe that there were illuminations only on the second day. On the Thursday, the consumption was 3,883,000 cubic feet, and on the Friday, 4,716,000 cubic feet; while the figures which Mr. King is able to oppose to these for the same days last year are respectively 5,210,000 cubic feet and 6,532,000 cubic feet

Then we come to the statistics for Newcastle; and there the holiday question does not affect the gas output with the same severity as in most other places, for the reason already mentioned. The figures for Thursday and Friday and the corresponding dates last year have, in consequence, a closer relation; and those for the Saturday, also comparing with a workman's holiday last year, are better than those for the same day of 1901—the improvement presumably being due to the illuminations which were carried out on the Saturday. The outputs were: On June 26, 3,677,000 cubic feet; June 27, 3,911,000 cubic feet; and on June 28, 5,000,000 cubic feet. The output for the same days last year were: 3,913,000, 4,291,000, and 4,516,000 cubic feet respectively. Mr. Gibb has sent with his figures the temperatures registered at 10 A.M.; and, as he points out, they are of interest. On June 26, the temperature was 55°; the following day it was 71°, and on the Saturday it was 84°. The comparative temperatures for last year were 66°, 72° and 59°. While the Newcastle figures do not go so directly to the point that this article is intended to clearly show, they help to that end when all the circumstances are considered. The illuminations at Sheffield were on a comparatively small scale, as some of the largest shopkeepers requisitioned the Lord Mayor not to ask them to spend money in this way, as they thought it could be devoted to some better object. However, Mr. Hanbury Thomas has kindly looked up the statistics for the days of the jubilee and diamond jubilee of our late Queen. He finds that on June 22, 1887, there was a decrease of 11.35 per cent. in the consumption of gas as compared with the corresponding day of the previous year; and on June 22, 1897, the decrease was 19.97 per cent. Running over to Dublin, it is found that the illuminations were in full swing on Monday and Tuesday of last week; and Mr. F. T. Cotton tells us that the gas issued those two nights amounted to 2,228,000 cubic feet and 2,286,000 cubic feet. On the corresponding nights of 1901, the outputs were 2,894,000 cubic feet and 2,486,000 cubic feet. Here again, illuminations notwithstanding, there are fairly substantial relapses. Then getting across to Wales, we learn from Mr. Henry Morley that on June 26 the consumption was for the 24 hours 1,200,910 cubic feet, and on the following day 1,205,490 cubic feet. The comparative figures for 1901 are 1,503,120 and 1,434,640 cubic feet.

MR. MARTIN B. DALY, formerly Superintendent of the Northwestern Ohio Natural Gas Company, has been appointed General Manager of the Northwestern and East Ohio Natural Gas Companies. His successor as Superintendent is Mr. J. W. Macmahon, of Lima, O.

Depreciation of Coal and Coke by Shipment.

[Report submitted to the International Navigation Congress, Dusseldorf, by M. STELKENS.]

1. *Properties of Westphalian Coals and their Treatment.*—The coals of the Lower Rhenish and Westphalian basin may be divided into three groups, according to their degrees of hardness, stratification and use. Those forming the top layers are the gas flaming and gas coals, and these are the hardest; then follow the "fat" coals, and last the so-called "lean" coals.[1]

As regards hardness, the latter occupy an intermediate position between gas and fat coals. Of less importance are the forge coals (half-fat coals), which form a transition from the fat to the lean coals.

According to information communicated by the Royal Chief Office of Mines at Dortmund, the share of each of these three classes of coal in the total output of the Ruhr district is as follows:

Fat coals, 58 per cent.
Gas and gas flaming coals, 29 per cent.
Lean coals, 13 per cent.

Gas coals are easily inflamed, and burn with a long and somewhat reddish flame. As indicated by their name, they are principally used for making gas. As they produce very dense smoke, they are less adapted for use under boilers.

The fat coals, which are more extensively used, are also easily inflamed; they burn with a long flame and give but little smoke. They are an excellent fuel, but cake more or less. There was little demand formerly for the lean coals, which ignite with some difficulty. Nowadays they are mixed successfully with fat coals intended for domestic fuel, or are burnt in specially constructed domestic stoves, so-called continuously burning stoves.

The coals are either sent off from the collieries just as they are brought to bank, as so-called pit mouth coals, for various industrial and domestic purposes, or are first sorted out into various classes, according to their sizes. For the latter purpose the trucks empty the coals on to a screen, which allows the smaller particles—namely, the so-called slack and small coal under 90 millimeters grain—so-called nuts—to drop through, while the larger lumps are delivered on to a travelling band by the rotating bars of the screen. While moving along the band, all bats (slates) are picked out, and the picked coals, or so called lump coals, drop into railway trucks from a small height. The particles of coal that drop through the screen are caught by a second band, which frees them from slack and conveys them to the riddlers—movable screens—by which the nuts are separated into four sizes, namely:

I.—45 to 80 millimeters.
II.—25 to 50 "
III.—15 to 30 "
IV.— 8 to 15 "

Leaving the riddles, the nuts are conveyed by water troughs to the washing apparatus, where they are washed by artificially produced waves, which wash the lighter coal over the brims of the washing tubs, while the small stones or lumps of slate that may have remained among the coal sink to the bottom, owing to their gravity. From the washing apparatus the nuts are loaded into railway trucks. They are still pretty wet, although they had an opportunity to drain as they travelled along the band. If there is any frost, while the nuts are loaded on to the railway, they often freeze into a hard, compact mass in the trucks, and have to be hacked out when unloading. The riddled fine coal slack cannot be burned very easily, and is, therefore, mixed with some suitable, inflammable binding material and made into briquettes; or, if obtained from a suitable fat kind of coal, it is made into coke. Those pieces of coal which are sorted out first in the treatment make the best fuel, provided there are very few stones among them. They supply the best steam coal, but are principally used for mixing with and improving coals which have been broken up in transit, and have consequently depeeciated in value. Of the washed nuts, sizes I. and II. are chiefly used for domestic fuel. Fat nuts of size III. are also called smithy coals. No. IV. nuts are burned in specially constructed domestic stoves—Storp's stoves—but are also used as steam coal, especially in Holland.

The continuously burning stoves mentioned above, which have of late years come into extensive use, require as much as possible lean anthracite-like coals of the size of No. II. nuts, but must contain very little slack.

2. *Coke and its Depreciation by Transport.*—The lighter and more compact coke will produce considerably less dust in loading and transporting than coal. Its depreciation, however, will always be noticeable,

1 An explanation of these names is given below.

as coke dust has absolutely no value as fuel, and for blast furnace purposes coke of a certain size and hardness, and free from all dust, is demanded. Softer coke would be crushed under the mixture in the furnace, and small sized coke, or more especially coke containing dust, would choke the blast. Geheimer Kommerzienrath Später, of Coblenz, has found by experiments that coke depreciates 0.89 per cent. in value by crumbling if carried all the way by rail, and 1.74 per cent., or almost twice as much as before, if forwarded by mixed route with double transhipment. These statements are borne out by the custom adopted on the part of French smelters, who reckon a loss of one to two francs per wagon load of coke from the Ruhr district, the price of the load being about 220 francs.

3. *Crumbling of Various Kinds of Coal by Trans-shipment in the Rhenish Ports.*—The crumbling of coals by transport chiefly depends on their brittleness. The quantity of slack produced varies very much sometimes, even with coals obtained from the same seam. It is, therefore, impossible to make a hard-and-fast rule for calculating the depreciation of coal accurately. Coals, especially from different districts, must, therefore, be examined separately in each case. According to experiments made in the Imperial dockyards at Danzig, Kiel and Wilhelmshafen, the following degrees of hardness have been found—*e. g.*, for coals received from the Ruhr district in Westphalia and the Upper Silesian collieries:

Description of Coal	Gas Coal.	Gas Flaming Coal.	Fat Coal.	Lean Coal.
Westphalian.....	65 to 75	Up to 80	35 to 55	42 to 55
Upper Silesian...	....	80 to 90	80 to 82	....

These figures agree with the quantities of slack obtained at the screening places at the collieries. According to experience, fat coals produce slack amounting to up to 60 per cent. of the total quantity brought to the pit mouth, while gas coals give an average of only from 40 to 50 per cent.

Of the various kinds of coal the hardest give the least amount of slack; consequently, according to the subdivision in the introductory classification, gas flaming coals give the least; next follow lean coals, half fat coals, and finally fat coals, which are the most brittle. Of the various classes of coals, lumps which when handled naturally work the greatest havoc owing to their weight, suffer more than nuts under equal conditions of transport; and nuts suffer more than pit mouth coal that is very full of slack. Slack does not depreciate at all, as it is chiefly made into coke or briquettes, and is best adapted for these purposes if it is in the shape of fine powder.

With regard to nuts, we ought to remark that not the whole quantity of slack found with it at the end of the journey is due to transport. As mentioned above, they leave the colliery pretty wet, and in this condition many small particles of coal adhere to them, the greatest portion of which drop off and produce a quantity of slack, when the coals arrive dry at their destination and are unloaded.

Nuts I. and II., as already mentioned, are principally used for house fuel, but these, and especially good anthracite nuts of No. II. size, are difficult to sell if they contain much slack, and they have, therefore, to be riddled at the transfer ports before they are delivered to the consumer. On the other hand, coals used for ordinary industrial purposes—more often they are a mixture of lean and fat coals—can bear an increase in slack in their composition without losing appreciably either in quality as fuel or in value as merchandise. In spite of this, however, it is of advantage to send only the best kinds of coals to any great distance, because proportionately better prices can be obtained for them, as the cost of transport remains equally high for all kinds.

The pecuniary loss incurred through depreciation of coal by transport finally depends also on the price which consumers, like briquette makers, coke producers, brick makers employing ring kilns, etc., are prepared to pay for screened slack.

In the Rhenish ports of the Westphalian coal basin, the coals received by rail are either loaded immediately into Rhine boats or they are stacked. In the first case, steam cranes are mostly used for handling lump coal, which is not transhipped in any great quantity; the other kinds of coal are shipped either by coal tips or by small narrow gauge tip wagons. The latter are also used for conveying to the boats coals that have been stacked previous to shipment.

At the end of the journey the coals are either loaded immediately into railway trucks by cranes, or are first stacked and forwarded later on by railway. Upon the whole, if the places of consumption are not situated along the water route, there are two, three or four more transfers necessary than in the case of direct transport by rail all the way, if coals are sent by mixed route—*i. e.*, by rail and water, according to whether the coals are stacked not at all, or once or twice. Every transfer entails a loss in the value of coals, which turns the scale in favor of the railway in respect of proportion of costs of transport.

Based upon information supplied by various leading coal merchants, and the experience gained at the port of Ruhrort, an attempt has been made to express in figures, in the tabular statements on this page, the depreciation of coals carried by mixed route—that is, partly by water. In lieu of the upper and lower limits, which generally differ from each other as much as 60 per cent., average values have been introduced. With these, of course, correspond an average hardness of the coal and an average drop in handling them, the drops varying very much owing to the fluctuation of the water level in the Rhenish ports.

The depreciation, expressed in money, of 10 tons of coal forwarded by rail and boat can be obtained from columns 10, 11, 13, 15, in columns 12, 14, 16, by multiplying the percentages of weight of slack by 10 tons, and the difference in the prices of coal and slack respectively.

4. *Depreciation by Through Railway Transport.*—If the railway trucks, after being loaded at the colliery, are sent direct to the place of consumption, the proportion of slack in the coal will only be increased by the shocks produced by shunting, by the starting and pulling up of trains, and by the wheels when passing over rail joints. Such a depreciation, though only very small, actually exists, according to a com-

Depreciation of Coal Carried by Mixed Routes.

Class of Coal.	Average.		Average Percentage of Slack Formed.				Average Prices of Coals in Manheim, Calculated at an Average Rate of Freight by Water.			Depreciation of Coal by Shipment.					
			In the Export Harbor.		In the Import Harbor.					I. By Shipment without Stacking.		II. Stacked Once.		III. Stacked Twice.	
	Price of 10 tons at the Colliery.	Proportion of Slack at the Colliery.	Loaded into Boat.	Dumped on the Ground; Temporarily Stacked and Loaded Afterwards.	Discharging from the Boat.	Dumped on the Ground; Temporarily Stacked and Loaded Afterwards.	10 Tons of Coal Cost.	10 Tons of Slack Cost.	Difference between Prices of Coal and Slack.	Total Quantity of Slack Formed.	Depreciation in Value of 10 Tons of Coal.	Total Quantity of Slack Formed.	Depreciation in Value of 10 Tons of Coal.	Total Quantity of Slack Formed.	Depreciation in Value of 10 Tons of Coal.
1.	2.	3.	4.	5.	6	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
	marks.	p. c.	p. c.	p. c.	p. c.	p. c.	marks.	marks.	marks.	p. c.	marks.	p. c.	marks.	p. c.	marks.
Common Ruhr pit-mouth coals (fat coals) 25 p. c. lumps over 30 mm.	100	75	2	2	2	2	145	110	35	4	1.40	6	3.10	8	2.80
Best mixed fat pit-mouth coals, 50 p. c. lumps over 30 mm.....	110	50	2.5	2.5	2.5	2.5	155	110	45	5.0	2.25	7.5	3.38	19	4.50
Gas flaming pit-mouth coal, 50 p.c. of the lumps over 30 mm.....	110	50	2	2	2	2	155	110	45	3	1.35	5	2.25	7	3.15
Fat nuts..... I. and II.	130	2	9	6	3	5	193	110	83	15	11.62	20	16.60	25	20.75
Fat nuts..... III.	115	2	7	4	3	4	174	110	64	10	6.40	14	8.96	18	11.52
Fat nuts..... IV.	100	3	4	2	2	2	153	110	43	6	2.58	8	3.54	10	4.30
Gas flaming nuts..... I. and II.	130	2	5.5	4	4.5	4	190	110	80	10	8.0	14	11.20	18	14.60
Gas flaming nuts..... III.	115	2	4.5	3	3.5	3	173	110	63	8	5.04	11	6.93	14	8.82
Gas flaming nuts..... IV.	100	3	3	2	2	2	150	110	40	5	2.0	7	2.80	9	3.60
Lean nuts II. (anthracite).....	230	2	5.5	5	4.5	5	305	90	215	10	21.50	11	32.25	20	43.00

munication received from a coal syndicate, and increases with the distance over which the coal travels.

As no direct experiments are at hand in respect of the quantity of slack formed in the course of uninterrupted railway transit, we have to content ourselves with the more or less corroborated statements of coal merchants.

Some experts do not think that any appreciable increase takes place in the quantity of slack by the jolting and rubbing together of lumps of coal in the trucks during the journey; others estimate the depreciation in value at 2 per cent. maximum, which includes the losses entailed by the breakages caused by loading on, and unloading from the trucks. This loss in value is made good by the 2 per cent. excess weight usually allowed by the collieries.

According to the terms of the specification under which lump coals are usually supplied to the German Imperial Navy for raising steam in their marine boilers, 10 per cent. of slack are allowed in coals if received by rail, and 20 per cent. if received by water; which also proves that coals crumbles less if they are sent by railway only.

5. *Faults of the Loading Appliances used on the Rhine, and known Suggestions for their Improvement.*—The usual method employed in Rhenish ports, of tipping the coals into the holds of boats, is a very convenient and cheap process, but depreciates the value of coals. If we take from the tabular statement published above the average depreciation of coal at 2 per cent., the loss in value of a 10-ton truck load will be 0.70 mark—*i.e.*, as much as the cost of tipping, assuming the difference in price between coal and slack at 35 marks per 10 tons. When coals are loaded with steam cranes, there is less breakage, but the cost of transloading is about 2½ times higher. Tipping a truck load of coals costs 0.70 mark on an average; loading by crane 1.70 mark. Cranes are, generally, only used for lump coals and briquettes; but they are almost exclusively used for unloading boats either with grabs or skeps, so that hand power has, naturally, to be employed more extensively in this case. Unloading with grabs is about four times cheaper than with skeps that have to be filled with shovels. The formation of slack is also less with grabs than when coals are shovelled into skeps. A grab of 1½ tons capacity grabs at one operation as much as 150 shovels can place in the skep. Chain and bucket conveyors are employed at a few works along the waterside for unloading colliers, but they have gained only small importance for the transfer of great bulks between railway and boat.

There has been no lack of experiments and suggestions to prevent breakage when handling coals. We may refer here to four classes of them:

1. There should be a possibility of vertical adjustment in coal tips, so as to enable them to tip from a constant height, which should never exceed that which is absolutely necessary.

2. The railway truck should discharge from a constant—consequently minimum—height into a large hopper, which is to be swung out by a crane over the hatchway of the boat, and after being lowered into the hold should drop the coals from a small height on to the heap.

3. Introduction of a new type of coal truck, with side doors which could discharge the coal from a minimum height into receptacles, so called pockets, behind the quay walls, from which the coal would be conveyed to the boats.

4. The Jeffrey Manufacturing Company of Ohio, U. S. A., constructs for high drops shoots or troughs, in which excessive speeds are prevented by endless ropes or bands fitted with disks, which can be controlled by a brake.

Of these four different contrivances, however, not one has as yet been tried in any port on the Lower Rhine. The natural suggestion, that only pit-mouth coals should chiefly be sent by water, and that in the larger transfer ports works should be erected between railway and boat for the treatment of coals, would not offer any advantages in respect of coals despatched from the Ruhr district. By washing the coals, some 10 to 15 per cent. of stones are picked out from the pit-mouth coals. There would be freights to pay on this useless rubbish, and to dump the stones, land would have to be bought near the port at a greater cost than it can be bought at near the collieries, where extensive lands can be had, as a rule, at a cheap rate. On these grounds, and also in consequence of the raw material tariff, which has reduced rates on long railway journeys, the two coal washing places at Gustavsburg, the only ones on the Rhine, have stopped work.

On the other hand, numerous briquette factories and screening factories, where coals are screened through 10 to 15 millimeter sieves, and are freed from slack but not from small pieces, are working with advantage in transfer ports. There are no coking ovens at work on the Upper Rhine. There may, perhaps, be some use for them in the immediate neighborhood of the blast furnaces. Their success, however, seems to be somewhat doubtful, because the above mentioned loss of a small percentage of dust from coke in transport can hardly equal the extra cost of transport for the heavier coal used for coking.

6. *Deterioration of Coal through Stacking. New Coal Stores.*—It is clear, from the tabular statement, that if coals are stacked once or twice, they have to be handled several times; and apart from the cost of handling, they depreciate in value owing to breakage. Stacking the coals, however, cannot be avoided either in the export or import harbors. While the output of the collieries approximately remains uniform, the navigation depends on the depth of water and the state of weather. When conditions are favorable as regards depth of water, great quantities of coal, over and above the actual demand for the time being, are forwarded to the Upper Rhine; and little traffic is going on, on the other hand, when the water is low. As a rule also, the despatch of coals from the transfer ports will not always be uniform, because consumers are careful not to lay in large stocks of coal, and to lose interest on their money thereby, when, owing to the regularity of railway working, they can always reckon upon a punctual delivery of coals whenever they may want them. There seems to be a possibility to prevent by suitable arrangements the breakage of coals in connection with stacking. The system now adopted at Ruhrort and Duisburg is to shovel out the coals from the railway trucks standing on elevated roads carried on piers, and to cart them away in wheelbarrows or small tip trucks, so as to make full use of the expensive places that are available for stacking. Besides handling the coals twice over, the weather prevailing at the time when coals are stacked, the trampling about of the workmen among the coals, and the superincumbent weight of the upper layers, all contribute towards breaking the coals and turning them into slack.

As the liability to spontaneous ignition increases with the height to which coals are heaped up, the stacks, if possible, are never made higher than 5 meters.

Warm rain during and after stacking, and strong compression by dumping down the coals from great heights, all add to the danger of ignition. According to past experience, gas flaming pit-mouth coals ignite most easily; fat pit-mouth slack, lean slack and nuts less readily; lump coals only very seldom. An increasing proportion of slack and small stones contained among the coals reduces the height to which any kind of coals can be stacked without danger of ignition.

In order to reduce the danger of spontaneous ignition of coals stacked at a great height, wooden air passages can be built in; and every spot where any suspicious rise in temperature is observed by probe rods or by a thermometer lowered down in gas tubes, should be laid bare at once.

Cranes with grabs will be found very useful for this purpose.

The newest kind of loading with transportable bridges, constructed by Hunt, Brown, and others, considerably reduce breakage, and there is less slack when working with them than when coals are carted away and dumped down in the usual manner. Their tubs or grabs discharge the coals from a small height immediately over the stack, and handling the material with grabs prevents also the workmen trampling down and breaking the coals on the stacks. Still more successful in this respect are the coal silos recently built at several places (as, *e.g.*, at Hamburg, Roubaix, Copenhagen), but owing to their great cost of construction they can only be adopted where the price of land is very high, and where they are intended for temporary storage. Experience has proved that coals can be stored in them to any desired height, because they are always taken away at the bottom, and the whole mass is frequently set in motion thereby. The silos can be so arranged as to discharge their contents directly into boats or carts, and can easily be combined with a screening plant in such a way that after the coals have once been lifted into the silo, they can be worked by gravitation through all the various stages of handling and treatment.

Ordinary coal sheds have also been constructed on the principle of silos, with hoppers in the floors. Travelling cranes deposit the coals. To discharge them the hoppers are opened and the coals drop on to travelling bands, which convey them to the place of consumption or the vehicles. The cost of this arrangement is comparatively small, but it can only be adopted where there is land at a suitable high level, and where the storage ground is not liable to be flooded.

Mr. J. H. Findlay, who as elsewhere stated has, with Mr. W. P. Engel, of Defiance, O., secured control of the Charlotte (Mich.) Gas Company, is to have active charge of the plant. He will assume the management August 15th. Good luck to him.

Faben's Gas Purifier Grid.

On May 20th, 1902, U. S. Letters Patent (No. 700,188) were granted to Mr. Charles R. Faben, Jr., of Toledo, O., for improvements in gas purifier grids. Using the words of the specification:

The invention relates to trays or grids for gas purifier boxes, and its object is to provide for more effectively and economically supporting very fine purifying material, such as oxide of iron, containing the largest possible per cent. of effective purifying constituents for securing the best results in purifying gas.

Another object of the invention is to provide a tray which is much simpler, cheaper in construction, and easier to repair than the ordinary slatted tray in general use, and which is also simpler and more effective in operation, giving more economical and satisfactory results than such tray.

The details of construction of the improved trays or grids are illustrated in the accompanying drawings, in which

Fig. 1 represents a vertical, longitudinal section of a gas purifier box

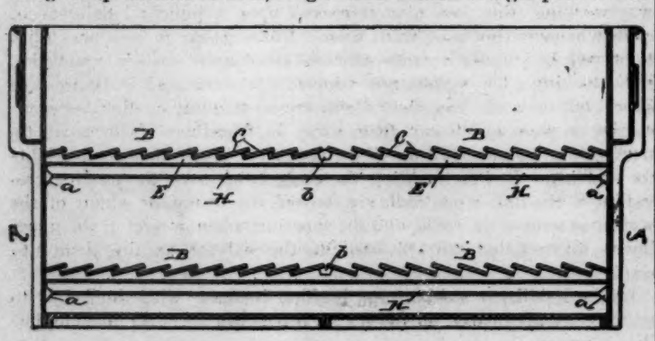


Fig. 1.

containing improved trays or grids. Fig. 2 represents a transverse section of the trays or grids, on enlarged scale, made and supported in accordance with the invention and part of a purifier box. Fig. 3

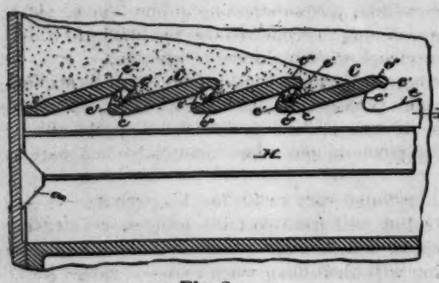


Fig. 2.

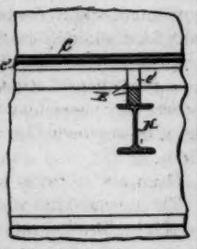


Fig. 3.

represents a section at right angles to the section of Fig. 2, showing one of the supports for the grids.

The gas purifier screens or grids now generally in use are constructed with vertically disposed slats or bars in the same horizontal plane and spaced to form vertical passages of about ¼ to $\frac{1}{16}$ of an inch between them. These screens or grids will not satisfactorily support the very fine oxide of iron (bog ore in fine powder or cast iron borings) which is employed without there being mixed therewith an objectionable proportion of coarse inert material—such as planer chips, wood shavings, etc.—which naturally reduce the bulk of effective purifying constituent in the material.

The trays or grids are made of comparatively wide boards or slats overlapping one another at the edges, where they are vertically spaced apart to form horizontal or nearly horizontal gas passages, and the upper face of each board has an upwardly projecting bead or flange near its edge to arrest the fine purifying material at the angle of repose, so that ample provision is made for the flow of gas into and through the material, while the latter is prevented from falling down from the tray.

A convenient and practical embodiment of the invention is illustrated in the accompanying drawings; but the invention is not confined to the details of construction therein shown. The purifier box *A* is of the usual construction, and is provided with the interior brackets *a*, for supporting the I-beams *H*, or other angle iron bearings for the layers of grids *B*. The grids are constructed of comparatively wide boards or slats *C*, which are seated on the serrated boards or blockings *E*, which are placed at their ends, along the walls of the box, and intermediately on the angle iron beams *H*, as shown in Fig. 3. The serrated seating and spacing devices *E* are made with long inclined seats or bearings *e*, and upright bearings or spacing risers *e'*, so arranged that the slats *C* shall be vertically spaced apart at their overlapping edges and that the overlaps shall be uniform and of sufficient extent to provide that the angle of repose of the purifying material will permit it to approach the edge of the slat. Since the boards or slats *C* are transversely inclined to provide for the vertical spacing to form horizontal gas passages, it is necessary to provide the face of the slat at its edge with a longitudinal stop device to hold the foot or base of the material at the angle of repose, so that the material shall not run over the edge of the slat. For this purpose the face of the board *C* near its edge is rabbeted or otherwise formed with a longitudinal depression *c*, the bottom of which is inclined toward the base of the bead *c'*. The depression and bead are thus formed in the body of the board or slat in the simplest, cheapest, and most practical manner. The reverse side of the slat is preferably beveled at *c''*, so that the strip *E* need not be so deeply serrated, and thereby weakened, but is made with a corresponding bearing surface, as shown. The slat at its opposite faces, near its opposite edges, is made with longitudinal depressions and beads substantially alike, and each face is beveled at *c''* near the edge, so that the slats shall be right and left, and can be reversed on their seats. This construction facilitates the operation of placing the slats in position, as either face may be placed upward and either edge against a spacing riser of the strip *E*. The slats *C*, when made of wood, are about 8 inches wide by 1-inch thick and lap about 2 inches over one another, and may be 6 feet long or any other convenient length. They are not fastened together or to their spacing strip and can, therefore, be separately lifted out of the box and readily cleaned. By reference to Fig. 1 it will be seen that the slats are laid so as to be inclined upward and inward from the opposite sides of the box toward the middle for directing the gas through the body of purifying material. At the middle the adjacent slats rest at their inner edges on the bar *b*. With the ordinary tray much of the gas passes up between the purifying material and the sides of the box, thereby escaping proper purification. This defective operation is corrected by the above arrangement of the inclined slats composing my grids.

Though the slats *C* are described as being made of wood, they may be made of metal or other suitable material. The details of construction may be varied so long as there are retained the slats, overlapping and vertically spaced apart at their edges, making substantially horizontal gas passages, and each slat having near its edge an upwardly projecting bead or flange to arrest and hold the fine purifying material at the angle of repose.

The inventor's claims are:

1. A grid for a gas purifier composed of comparatively wide bars or slats having their edges in the same horizontal plane, overlapping and vertically spaced apart, making horizontal or nearly horizontal gas passages.

2. A grid for a gas purifier composed of comparatively wide, transversely inclined bars or slats having their edges in the same horizontal plane, overlapping and vertically spaced apart, and having means at their lower edges for arresting or holding the purifying material at the angle of repose.

3. In a gas purifier, the combination with inclined supporting seats and spacing risers of wide, transversely inclined, overlapping bars, or slats, having horizontal gas passages between them.

4. A bar or slat for a purifier grid having flat opposite sides and a bead or flange perpendicular to its face, at one edge.

5. A bar or slat of a purifier grid having in its face near one edge a longitudinal depression, and at its edge a bead or flange rising above the bottom of said depression.

6. A bar or slat of a purifier grid having longitudtnal beads or flanges projecting from its opposite faces at or near its opposite edges.

7. In a gas purifier box the horizontally placed, serrated strips having inclined seats and spacing risers, in combination with the transversely inclined, overlapping bars, or slats.

8. A bar or slat of a purifier grid having in its face, near one edge, a longitudinal depression, the bottom of which is inclined downward and outward, and a longitudinal bead rising above the bottom.

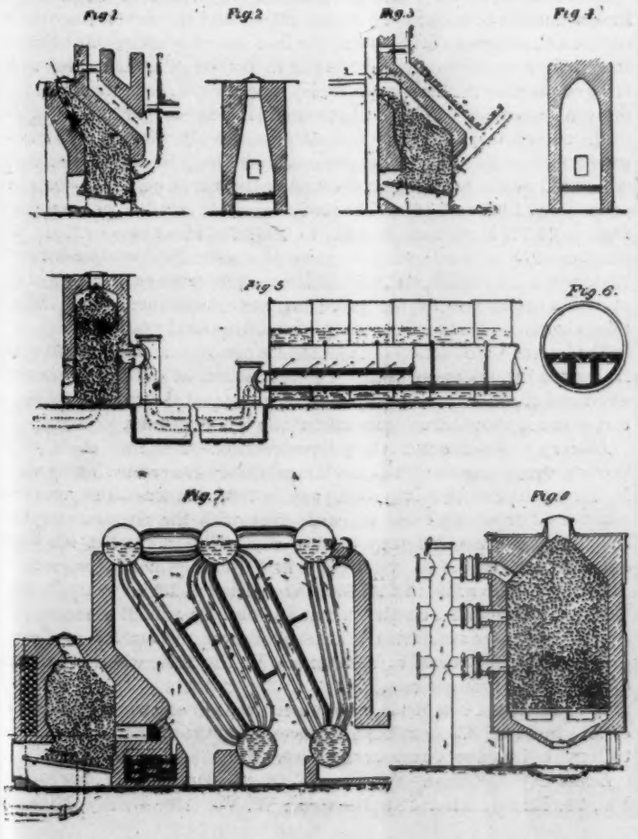
9. In a purifier box, the grids composed of overlapping bars or slats inclined upward and inward from opposite sides of the box for directing gas from the sides toward the interior of the purifier material.

10. A bar or slat of a purifier grid longitudinally beveled at the edge of one face, and having in its opposite face near the same edge a longitudinal depression, and at its edge in such face a bead or flange rising above the bottom of said depression.

Herring's Arrangement and Application of Gas Producers.

The last issue of the *Gas World* at hand contains a description of an invention, by Mr. W. R. Herring, of the Edinburgh (Scotland) Gas Works, concerning improvements in gas producers—the improvements are covered by British Letters Patent, or an application therefor, numbered 12,887. As noted the invention relates to improvements in gas producers, and primarily consists in having the gas outlet port of the producer at a point below the normal surface of the fuel bed, but sufficiently far above the base of the fire to insure the conversion of the carbonic acid, produced by the primary combustion in the lower strata of fuel, into carbon monoxide and other gases by its passage through the mass of incandescent fuel on its way to the gas outlet port. The volatile matters issuing from the newly fed fuel are thus compelled to pass downwards through the mass, and are converted into fixed gases on their passage through the incandescent fuel to the outlet port. The slight pressure resulting on the surface of the fuel bed in the upper part of the producer also prevents the ingress of air and the premature combustion of the gas. By this means pure gas of a consistent quality will issue from the producer. The invention is applicable to all purposes where heat is required, and the producer can be constructed either in direct association with the respective plants or as a separate plant, the gas in the latter case being conducted to the different points where it is required by means of a conduit.

Figs. 1 to 4 show transverse and cross sections of two slightly different forms of producer made in accordance with the invention. In both cases the outlet port divides into two conduits, which are controlled by dampers. Fig. 5 shows a producer arranged to fire a Lancashire boiler. Fig. 6 (a cross-section through the flue of the boiler) shows how the gas reaches the combustion hearth through a central channel and air by two side channels. Fig. 7 shows a producer applied to the firing of a water tube boiler. The front of the producer is jacketed by checker brickwork, through which the primary air may be passed to heat it. A heater for the secondary air is also provided. Fireclay tiles lying upon the tubes of the boiler act as baffles to direct the gases in the directions indicated by the arrows. An air blast pipe, with a perforated cap upon it, is shown. As shown in the figure, the pipe and cap are in position for the producer to be used as a solid hearth; but by lowering the pipe and cap the producer may be used as a grate bar, forced blast furnace. When the producer is used as a solid hearth producer the fire bars are withdrawn and the ashes and clinker allowed to accumulate and bury the blast pipe projecting above the level of the furnace base. As there are usually some 6 or 8 inches of water in this portion of the producer, under all circumstances of working, the steam and moisture arising from this will be sufficient to protect the blast pipe, which, in a sense, will be projecting into the fuel bed. The perforated cap is merely to prevent the ashes in the one case, or the fuel in the other case, falling into the pipe.



In the producer shown in Fig. 8 three off-takes for the gas are provided. These are controlled by water jacketed valves, so that the gas can be taken off through any or all of them. The gases from the various levels can be conducted away separately and used, in accordance with their chemical composition, for different purposes. For instance, in the event of bituminous fuel being used the volatile products generated in the upper part of the producer can be conducted away through the upper ducts and used for lighting, whilst from one or more of the lower ports gas of a poorer quality (suitable for gas engines and the like) may be taken off, and fuel gas of constant quality free from hydrocarbon mixtures and water vapor will issue from the lower port. Shut-off valves are provided on the main duct to keep the gases separate.

Production of Coke in 1901.

By "W. L. C." in *Iron Age.*

The annual report of the United States Geological Survey on the production of coke in the United States in 1901, by Edward W. Parker of New York, has been completed, and shows that, including the output from 1,165 retort or by-product ovens, the total quantity of coke amounted to 21,495,883 short tons, valued at $44,445,923, as compared with 20,533,348 short tons, valued at $47,443,331, in 1900, and 19,668,569 short tons, valued at $34,670,417, in 1899. The increase in production in 1901 as compared with the preceding year was 1,262,535 short tons, or 6.14 per cent., and was the largest output recorded in the history of the industry. The value of the product, however, showed a decrease of $2,997,408, or 6.3 per cent.

Causes of the Lower Value in 1901.—Notwithstanding the fact that the extraordinary demand for coke, which developed in 1899 and continued through 1900, was maintained throughout 1901, the average price per ton showed a decline from $2.31 in 1900 to $2.04 in 1901. This decline in price was a natural one, as during the spring of 1900 the prices were abnormally high and raised the average for that year to a figure nearly 15 per cent. higher than the average of any year since 1880. A decline in 1901 was to more normal figures, although the average for the year was higher than for 20 years, with the exception of 1900. Another cause of the decline in value in 1901 was the fact that the number of completed ovens increased from 58,484 in 1900 to 64,001 in 1901 and the producers were better able to supply the demand, and the increased facilities for transportation furnished by the railroads enabled them to market the product more rapidly. Connellsville coke may be taken as a basis for comparison. During 1901 Connellsville furnace coke ranged from $1.75 to $2.25, the lower figure being quoted in January and February and the higher price in December, with a general advancing tendency throughout the year. In 1900, on the other hand, Connellsville furnace coke, which opened at from $2.75 to 3.50 in January, advanced to as high as $4.25 in March and April, large sales being made at these high prices. Prices then steadily declined until December, when they were quoted at $1.75 to $2.

The value and the average price for coke are in many cases arbitrarily fixed, as a number of the larger manufacturers operate blast furnaces in connection with their coal mining and coke making business, in which cases the coke product is sometimes charged against the other departments at cost and sometimes at a figure based upon the cost of mining the coal and making the coke with a percentage of profit on these operations. The value is not regulated according to the market price of the product at that time. In other cases, when no value of the coke is given by the operator, this has been estimated upon the values given by other operators producing practically the same grades of coke in the immediate vicinity.

Extent and Location of the Coke Industry.—At the close of 1900 there were 5,804 new ovens in course of construction, of which 1,096 were by-product ovens. Only 80 of the latter, however, were completed during 1901, and the increased production last year was almost entirely from beehive ovens. At the close of 1901 there were 5,155 ovens in course of construction, of which 1,533, or 30 per cent., were by-product ovens. The production of by-product coke increased from 1,075,727 short tons in 1900 to 1,179,900 short tons in 1901.

The number of coke making establishments as shown by the returns for 1900 was 396, which increased in 1901 to 423. In the latter year the number of establishments, the ovens in operation and the amount of coke produced, by States, are shown in the following table:

	Establishments.	Ovens Built.	Coke Produced. (short Tons.)
Alabama	31	7,136	2,148,911
Colorado	15	2,060	671,303
Georgia	2	510	54,550
Indian Territory	3	230	37,374
Kansas	12	98	7,138
Kentucky	5	461	100,285
Maryland	1	0	....
Missouri	3	9	4,749
Montana	3	328	57,004
New Jersey	1	0	....
New Mexico	2	126	41,643
Ohio	8	419	108,774
Pennsylvania	188	34,906	14,355,917
Tennessee	14	2,135	404,017
Utah	1	204	....
Virginia	7	2,775	907,130
Washington	4	148	49,197
West Virginia	112	11,594	2,283,700
Illinois	3	154	....
Indiana	1	54	....
Massachusetts	1	400	
Michigan	2	30	564,191
New York	2	30	....
Wisconsin	1	120	....
Wyoming	1	74	..
Totals	423	64,001	21,795,883

The States which showed the largest increases in production during 1901 were Pennsylvania, whose total increase was 998,622 short tons, and Virginia, whose output gained 221,974 short tons. Other increases in production were unimportant. There were 5 States in which decreases were shown, the principal losses being sustained by West Virginia and Tennessee, where the decreases were 74,799 and 71,415 short tons, respectively.

The Heavy Growth of Production.—It is interesting to note the increase in the number of establishments as compared with the increase in production. During the calendar year 1880 there were 186 coke making establishments in the United States, which produced a total of 3,338,300 short tons, an average of 17,948 tons for each establishment; in 1901 there were 423 establishments, which produced 21,795,883 short tons, an average of 51,527 short tons for each establishment, or nearly three times the average for each establishment in 1880. It should be stated, moreover, that the number of establishments in 1901 includes the 14 new establishments, having a total of 2,185 ovens, which did not begin operations until after the close of the year. During this period the number of establishments has increased 127 per cent., while the production has increased over 550 per cent.

The table presented above shows that there were 64,001 ovens in existence at the close of 1901, but it does not mean that all of these were in active operation. Of the 423 establishments in existence on December 31, 14 did not begin operations until 1902, and 53 establishments, having a total of 2,605 ovens, were idle throughout 1901, leaving 356 establishments, with a total of 61,396 ovens, in active operation. It will be seen from this that practically all of the idle plants were of comparatively little importance, the 53 idle establishments having an average of 49 ovens each, while the 356 active ones averaged 173 ovens. There were only 8 of the idle establishments in 1901 having more than 100 ovens to each.

In this connection it is also interesting to note the increase in the productive capacity of the coke ovens in the United States. It is not possible to compare the number of ovens in active operation each year and the averages must be based upon the number of ovens in existence on December 31. In 1880 the number of ovens in existence was 12,372. The total coke production was 3,338,300 short tons, an average of 278 short tons of coke per oven. In 1890 the total number of ovens had increased to 37,158 and the coke production to 11,508,021 short tons, an average of 310 tons of coke per oven. In 1901 the number of active ovens was 61,396, which produced 21,795,883 short tons, an average of 355 tons per oven. The 1,165 by-product ovens in operation in 1901 averaged 1,013 tons of coke each.

Statistics of Production Since 1850.—The statistics compiled and published by the Geological Survey during the last 22 years are the only reliable record of coke production in the United States. The census of 1850 showed that there were four establishments making coke in the United States in that year; the following census, 1860, reported 21 ovens; in 1870 25 ovens were reported as in existence; but the statistics of production were not stated separately. In the calendar year 1880 the coke production of the United States amounted to 3,338,300 tons; in 1890, ten years later, it had increased to 11,508,021 tons; in 1900 it had grown to 20,533,348 tons, and in 1901 it reached the maximum production of 21,795,883 tons. This growth has been fairly regular. There were 5 years in the 22 in which the production was less than in the preceding year. The most noteworthy of these were the panic years of 1893 and 1894, when the production fell off from 12,010,820 short tons in 1892 to 9,477,580 in 1893 and 9,203,932 in 1894. The industry recovered from this depression in 1895, during which year a production of 13,333,714 tons was obtained. This recovery was due to a short-lived boom in the iron and steel trade in the spring of 1895. It was followed by another year of depression in 1896, since which time the production has increased without interruption.

Average Value of the Coke Produced.—While it is not practicable to present the actual value per ton of every grade of coke produced in the United States, an effort has been made by the Survey to present an average value for the principal States. For 1901 these figures were as follows: Alabama, $2.82; Colorado, $2.42; Georgia, $2.83; Indian Territory, $4.14; Kansas, $2.11; Kentucky, $2.07; Missouri, $2.09; Montana, $5.91; New Mexico, $2.84; Ohio, $2.75; Peunsylvania, $1.88; Tennessee, $2.35; Virginia, $1.63; Washington, $4.85; West Virginia, $1.80. The product of Illinois, Maryland, Massachusetts, Michigan, New York, Wisconsin and Wyoming has averaged $2.85. The average for the entire country was $2.039.

Average Amount of Coal Used per Ton of Coke.—Some interesting figures presented in the report show the amount and value of coal used in the manufacture of coke per ton by States in 1901 as follows: Alabama, 1.79 tons of coal, valued at $2.028; Colorado, 1.71 tons, value $1.093; Georgia, 1.648 tons, value $0.989; Indian Territory, 2 tons, value $1.632; Kansas, 1.629 tons, value $1.482; Kentucky, 2.037 tons, value $0.894; Missouri, 1.90 tons, value $1.134; Montana, 1.806 tons, value $.493; New Mexico, 1.737 tons, value $0.973; Pennsylvania, 1.514 tons, value $1.369; Tennessee, 1.83 tons, value $1.865; Virginia, 1.543 tons, value $1.006; Washington, 1.59 tons, value $2.94; West Virginia, 1.635 tons, value $1.203; other States, 1.406 tons, value $2.285; average of the United States, 1.57 tons, value $1.44.

Coke Making in By-Product Ovens.—In the report of the Survey on the production of coke in 1900 it was stated that the development of the coke manufacture in retort ovens for that year was noticeable rather for the number of new plants and ovens in course of construction at the close of the year than for any increase in production or in actual number of ovens completed. The same statement is true in regard to this branch of the coke making industry for last year. While there were 1,096 by-product ovens building at the close of 1900, only 80 were added to the completed ovens during 1901, increasing the total number of completed ovens from 1,085 to 1,165. The production of by-product coke increased from 1,075,727 short tons in 1900 to 1,179,900 short tons in 1901. The number of by-product ovens in course of construction on December 31, 1901, was 1,533, which included 1,011 ovens reported as in course of construction at the close of the preceding year, a net increase of 522 new ovens begun in 1901 and not completed during that year.

The average production of the 1,165 by-product ovens in 1901 was a little over 1,000 tons per oven. The production of all the other ovens averaged about 343 tons per oven, indicating that the capacity of the retort ovens is about three times that of the beehive ovens.

History of By-Product Oven Construction.—The first plant of by-product ovens constructed in the United States was erected at Syracuse, N. Y., by the Semet-Solvay Company in 1893. It was an experimental plant of 12 ovens, operated in connection with the chemical works of the Solvay Process Company in that city. This plant has since been enlarged to a total of 30 ovens. The first Otto-Hoffman ovens were begun at Johnstown, Pa., in 1897 and completed in 1898. Sixty Newton-Chambers ovens were constructed at Latrobe, Pa., about the same time, but did not prove satisfactory. The plant was dismantled at Latrobe and another constructed at Pocahontas, Va., in 1900, where it has been operated with more success.

The number of completed by-product ovens in existence at the close of 1901 included 375 Semet-Solvay ovens, 730 Otto-Hoffman ovens and 60 Newton-Chambers ovens, which were distributed as follows:

Semet-Solvay Ovens.—Syracuse, N. Y., 30; Dunbar, Pa., 50; Sharon, Pa , 26; Ensley, Ala., 120; Benwood, W. Va., 120; Delray, Mich., 30.

In addition to these there were building at the close of 1901 60 Semet-Solvay ovens at Dunbar, Pa.; 120 at Ensley, Ala., and 30 at Delray, Mich.

Otto-Hoffman Ovens.—Johnstown, Pa., 160; Glassport, near Pittsburgh, Pa., 120; Everett, near Boston, Mass., 400; Hamilton, O., 50. In addition to these there under construction as the end of 1901 232 Otto-Hoffman ovens for the Lackawanna Iron & Steel Company at Lebanon, Pa.; 564 for the same company at Buffalo, N. Y., and 100 for the South Jersey Gas, Electric & Traction Company at Camden, N. J.

Newton-Chambers Ovens.—Pocahontas, Va., 60.

Schniewind Ovens.—These are an improvement made by Dr. Fred. W. C. Schniewind on the Otto-Hoffman ovens. At the close of 1901 there were 200 of these under construction at Sparrows Point, Md., for the Maryland Steel Company; 212 at Sharon, Pa., for the Sharon Coke Company, and 15 at Wyandotte, Mich., for the Michigan Alkali Company.

Notes Regarding the Operation of By-Product Ovens.—Of the 1,165 by-product ovens in existence at the close of 1901, 595, or a little more than half, were operated in connection with iron and steel plants. All of the Semet-Solvay ovens, with the exception of 30 at Syracuse, N. Y., and 30 at Delray, Mich., were operated in connection with iron and steel plants which consumed coke and surplus gas. The Otto-Hoffman ovens at Johnstown, Pa., are operated in connection with the Cambria Steel Company, who consume the coke and surplus gas. Those at Glassport, Pa., manufacture coke for domestic and metallurgical use, and dispose of the surplus gas to the rolling mills in the vicinity. The plant at Everett, Mass., which up to the close of 1901 was the largest one constructed in the United States, manufactures coke for domestic, locomotive and factory use, and disposes of its surplus gas to the Boston gas companies. The plant at Hamilton, O., completed during 1901, manufactures foundry and domestic coke and sells its surplus gas to the Hamilton Gas Company of that city.

Of the 1,533 ovens in course of construction at the close of the year 1,176 will be directly associated with blast furnaces or steel plants. The 60 new Semet-Solvay ovens under construction at Dunbar, Pa., will be operated, as the others at that place are, in connection with the Dunbar Furnace Company. The Tennessee Coal, Iron & Railroad Company will use the coke and surplus gas produced at the new Ensley plant of 120 ovens. The Lackawanna Iron and Steel Company, at their plants at Lebanon, Pa., and Buffalo, N. Y., will utilize the coke and gas produced by the Otto-Hoffman ovens building at these points, and the Maryland Steel Company at Sparrows Point will consume the coke and gas made at the Schniewind ovens now building there.

Specialization in Engineering Education.

Engineering Record, in editorial comment on the named topic, says there is probably no question on which there is a greater variety or a greater number of opinions among practicing engineers, and possibly among engineering educators themselves, than in connection with the subject matter and methods in the professional engineering schools. Masses of papers and addresses and discussions of them have been published within the last ten or a dozen years, bearing directly upon practically all features of engineering education, and yet there is probably not one of those features on which opinion is unanimous or anywhere near so. This is mainly due, obviously, to the rapid progress which has been made in all branches of engineering during that period. Indeed, so rapid has been the development and expansion of engineering specialties, and so urgent has been the demand for educated young men to take positions in those specialties, that many engineering educators have endeavored to meet the requirements of the situation by extraordinarily specialized lines of engineering education. This specialization of educational training has led to courses in mechanical enineering, electrical engineering, hydraulic engineering, railroad engineering, and in almost numberless other "engineerings" characterized by great intensity of work along the special lines which they represent, which is another way of saying that these developments of educational training are more or less narrow in scope, and in some cases very narrow. These restricted courses of engineering study have, in some cases at least, been confined between such narrow limits as to detract most seriously from their professional value. Many engineering educators throughout the country have frequently publicly expressed their regrets at this extreme specialization, and have not hesitated to state in papers and discussions that it was likely to trench most injuriously not only upon the broad, educational value of the courses of study, but also upon the ultimate professional efficiency and standing of the young men so narrowly educated. While some practicing engineers have from time to time taken the same general view of the subject, it is only lately that this particular phase of engineering education has attracted much attention from the profession in general, It is markedly significant that some of the strongest expressions regarding these mooted questions have emanated from that portion of the broad field of civil engineering which is devoted to what is probably the most specialized work of the engineer, both in practice and in the professional schools—*i. e.*, electrical engineering.

At the recent annual meeting of the American Institute of Electrical Engineers, the president, Mr. C. P. Steinmetz, made an address bristling with pointed references to this matter, which amounted in essence, if not in form, to emphatic disapproval of too much specialization. Among other things he states: "If, of the amount of material in electrical engineering as well as other branches which the educational institution of to-day attempts to teach, one-half or more would be dropped altogether, but the rest taught so as to be fully understood, with special reference to general principles and methods, the product of the institution would be far superior and more successful in practical life." Again: "Design of engineering apparatus is of very secondary utility and rather objectionable, with the exception, perhaps, of some very simple apparatus." Finally he states that the professional school should "give the student all the ground work required to be successful in future practice, but not the impossible aim of giving him a complete education as practical engineer." These quotations from Mr. Steinmetz's address go straight to the very pith and substance of the whole question of professional education. The function of the professional school, as he states, is not to attempt to make a finished practitioner, but to ground the young man especially in general principles of that which is too often disapprovingly called the theoretical work of the engineer, but in such a way as consistently to show its intimate relation to practical matters and how it is to be applied in the practical work of the engineer.

A number of other speakers at the same annual meeting criticized in an outspoken manner the dangers of too much specialization in the particular field of electrical engineering. Prof. Esty, of the University of Illinois, laid down the following general proposition: "Teach thoroughly those things which are fundamental; devote little time to highly specialized subjects; introduce the student to those branches of knowledge which in his later life he can acquire, if at all, only with increasing difficulty."

But one more quotation will be offered, although a considerable number of others might be made, and that from the address of Mr. H. W. Buck, electrical engineer of the Niagara Falls Power Company. He asserted "that many instances may be cited of men who have been prominent as electrical engineers who have been dropped out of place in the course of the rapid progress which has been made on account of lack of a theoretical foundation in their knowledge."

These are observations of unusual significance from the special field of electrical engineering; but views quite as strong upon the same general subject are held in other quarters, as illustrated by many papers which have appeared in the "Proceedings" of the Society for the Promotion of Engineering Education, one of the last of which is by Prof. Edgar Marberg, presented at the recent meeting in Pittsburg. His observations are quite pointed against too much specialization in civil engineering, and they are undoubtedly justified by the present tendency in many quarters.

It is a most serious question whether educators in engineering having charge of the professional courses in engineering study throughout the country should not carefully reflect upon these evidences of disapproval of too much specialization, both from the fields of practice and of education, and consider whether the intense specialization now being carried on among educators is not working damage both to the broad educational value of these specialized courses of study and to the future engineering work of the young men taking them. This specialization of professional study is not found in the law or medical schools of the country, although there is quite as much intensity of specialization in actual practice in both of these fields. Their courses of study, however, are much more wisely administered in this respect in that every student in law and medicine is obliged to pursue a broad and comprehensive professional course of educational training, giving him a familiarity with and a control of all the general principles underlying the practice of his profession in all of its specialties. The result is a course of study in the highest degree valuable as such, endowing him with the best possible foundation for any special field of professional practice which he may subsequently desire to follow. The broadly educated specialist, other things being equal, is by far the best specialist; he attains that end both in consequence of a better knowl-

edge of his own special field and of those lines of work affiliated with it; his grasp of general principles enables him to accomplish far more and to do it better than the narrowly educated man, and it will be but a short period after the beginning of his practice before he will outstrip him in every line of special work. While this is true of the specialist, it applies with greatly enhanced force to those engineers who fill administrative or executive positions requiring thorough knowledge of the fundamental principles of a number of affiliated specialties. Indeed, whether the specialist, the general practitioner or the executive engineer be considered, the broad, thorough course of educational training will qualify him for the greatest measure of success.

Induction Motors.

Electrical World reports that the "Question Box" at the recent electric light convention contained several queries relating to the operation of induction motors, and these brought out a large number of replies which form a valuable contribution to the practical side of the subject. Below we give the various replies as offered in written communications or in discussion of the questions at the meeting.

In reply to the question: Is it possible to operate induction motors for elevator service and other intermittent use from lighting feeders without serious disturbance to electromotive force? Mr. Ralph D. Mershon said such induction motors can be used for elevators and other intermittent services, and if the proper type be installed will cause practically no more disturbance on the lighting feeders than would be caused by the corresponding direct current shunt motor for the same service. Mr. W. T. Oviatt said his experience was that it is not possible to operate induction motors for intermittent service from lighting feeders without interference with the lighting. His experience includes single phase up to 7½-horse power, 3-phase up to 15-horse power. The single phase motors have been operated from a large system of secondary mains and separate transformers; the 3-phase have been operated only from separate transformers, and in all cases it has been found that they produce a serious disturbance to the lighting. Mr. F. L. Sargent, of Malden, Mass., said that the motor business of his company is all 3-phase and it does not allow any elevator service on the 3-phase motors unless the motor is running continuously on tight and loose pulley, or in a case of a hydraulic elevator with a by-pass valve, as otherwise too much disturbance is caused in the e.m.f. on the generators. He added that all of the power service is on circuits independent of lighting circuits. The experience at El Paso, Tex., of Mr. J. E. Barker with induction motors for elevators has been that the frequent starting and stopping causes the line e.m.f. to fluctuate to such an extent that it is impossible to do a satisfactory lighting business from the same line. This is not so important if a special power circuit is run, but, as the starting current is often four times the full load current, it is evident that large generators would be required to take care of a relatively small amount of business.

Mr. H. B. Geer, of the Chicago Edison Company, expressed the opinion that induction motors may be operated for elevator service and other intermittent uses from lighting feeders without serious disturbance of the pressure under certain conditions. In Chicago this class of service is being carried on 4-wire, 3-phase circuits, operated at 2,200 volts from neutral to phase wire, with 3,800 volts between phase wires. The circuits carrying these motors carry the lighting load on one phase, the size of the wire on that phase and the neutral being designed to give 5 per cent. drop from the station to the distributing center. The other 2-phase wires are No. 6 uniformly, the lighting wires being mostly No. 2. Such a circuit will carry elevators operated by 10 or 15-horse power motors without serious disturbance in the pressure at a distance of two to three miles from the station or sub-station. Mr. J. H. Perkins, of Youngstown, O., considered that under certain relative conditions between generator and motors, and if the motor is supplied by an independent transformer or a bank of transformers whose capacity is large relative to the motor, it is possible to operate satisfactorily induction motors on elevator loads. Mr. Charles F. Scott said the answer to the question depends on conditions. In some stations where the conditions are favorable various classes of motors can be operated without interference to the lighting service. In other cases it is not true. The same statement might be made with regard to direct current motors. The question might be put: Is it possible to operate direct current motors for elevator service and lighting on the same service? I know of cases where the induction motor has been criticised for not doing good work on elevators where a direct current motor would not be used, and in such cases the induction motor is expected to do more than the direct current motor would do.

Another question considered was as follows: What specification should prevail in purchasing induction motors to insure least disturbance to line electromotive force?

In reply Mr. Ralph D. Mershon said that the type of motor should be that having a rheostat included in its secondary circuit, the rheostat being such that it may be cut out by as great a number of steps as is necessary to keep the disturbance down to the point desired. In specifying the number of steps there shall be in the rheostat and the magnitude of each step, one should follow the course which would be followed in specifying the starting rheostat for a direct current shunt motor for the same service as that which the induction motor has to meet. In addition, the motor should, of course, have as high a power factor at all loads as is consistent with the maximum torque that will be required of it. Mr. Chas. F. Scott stated that specifications are sometimes presented which place the starting current as a certain fraction of the full load current, independent of the size of the motor. That is evidently not a fair thing, as a circuit which will enable a 10-horse power motor to start with, say, its normal full load conditions—that is, taking its normal full load current at the start—would permit of a 1-horse power or 2-horse power motor being started with two or three or four times its full load current, and not make the same disturbance on the circuit that the 10-horse power motor would starting with only its normal current. It would be better, therefore, in specifications of this kind, to place some limit upon the amount of current which can be taken from the circuit, or make different specifications for different sizes of motors, instead of making a specification which refers alike to all motors. If the starting current is specified in terms of a full load current, then it may be that a poor motor would pass the specifications and a good motor would not. For example, suppose two motors were used which took the same starting current, but one of them took a considerably greater running current than the other; the one with the greater running current would then be the poorer motor, but as it takes less starting current it might pass the specifications where the other motor would not.

Another question, and one which elicited a large number of replies, was as follows: What has been the experience from the use of single phase induction motors above 1-horse power on lighting feeders?

Mr. Ralph T. Patterson, of Waterville, Me., said that his company has in one 40-horse power and one 15-horse power and one 25-horse power induction motors on its lighting service lines, with no bad results, although it is true that there is a variation of the voltage in starting and stopping them. Mr. F. L. Sargent, of Malden, Mass., said that before the power circuits of his company were completed, several single phase motors were on their lighting feeders, from 1½ to 5-horse power, and they caused us no trouble. Mr. W. J. Greene, of Cedar Rapids, Ia., said that a 15-horse power, single phase induction motor caused no disturbance in regulation; at least no complaints were received that could be attributed to it. The motor was in use for 5 months prior to December 24th, 1901, for operating a stone crusher. Mr. C. E. Burrows, of Walla Walla, Wash., said his company has a 15-horse power Wagner single phase induction motor running a pump, current being generated at a water power station 5 miles away. Every time the motor is started or stopped every incandescent light in town is affected. It is a great nuisance. Mr. H. T. Gille, of St. Paul, Minn., said that the largest induction motor on the St. Croix lighting feeders is 3-horse power. No trouble has been experienced from motors up to this size interfering with the regulation on the lighting system.

Motors up to sizes of 20-horse power, Mr. J. H. Perkins, of Youngstown, O., said, had been satisfactory in every way and they will do all that can be done with a polyphase motor. They have an advantage in requiring only two wires and one transformer, which makes the cost of installation less and makes it economical to reach out of the way places as well as the point near the center of distribution. Motors that have been in service some 3 years have never had repairs or caused trouble. Mr. Perkins added that he would rather have 10 alternating current motors on his line than one direct current. His company operates 500-volt direct current and both single and polyphase motors.

The Missouri Edison Electric Company reported that the entire alternating current distribution of the company is single phase. In the concentrated business district it has the transformer secondaries cribbed on a 3-wire system, this network being fed from large transformers, the primary circuits of which are independently controlled from the station distribution switchboard. This network is of ample capacity for almost any demand that may be made upon it, and throughout this district it has been our practice to place no limit upon the sizes of single phase alternating current motors installed. Several hundred single phase motors are operating with entire success on this underground network, a number of which installations have individual units as high as 35-

horse power, with individual customers taking as high as 75 to 100-horse power for motor service alone. Practically all of these motors are of the Wagner Company's type, wound for 208 volts. In starting they are thrown on 104 volts, on which pressure they run up to about two-thirds speed, and are then thrown over to the 208-volt feeders. No difficulty has been experienced in operating incandescent lamps on the same service feeders, and the use of single phase motors in preference to other methods has enabled the company to very greatly simplify its general distribution system.

In the outlying districts of St. Louis, the alternating feeders are of 100 kilowatts capacity each. On these circuits the installation of single phase motors is permitted under the company's supervision, up to 10 and 15-horse power. In one particular instance a 15-horse power motor is operating satisfactorily at a distance of 4 miles from the station. It is the practice to require all these motors to be wound for 208 volts, and it is exacted that they start on 104 volts in exactly the same way as in the downtown districts. Where the motors are located at remote distances from the station, it is also recommended that they be started without load. By careful supervision of these outlying installations, the company has been able to take on a great deal of alternating current motor service without detriment to its lighting distribution, and in its opinion the single phase motor of to-day is a thoroughly practical and satisfactory machine; and if installed with intelligent supervision, it affords a means of securing a very satisfactory alternating day load, from districts into which it would be expensive and inconvenient to carry either polyphase alternating or direct current system of distribution.

The Quincy Gas and Electric Company reported that it has a number of these motors installed. By putting in sufficient transformer capacity as recommended by the companies furnishing the motors, no difficulty or inconvenience is found in running them on lighting feeders, and their use beyond the regular power circuit is quite a help to the income account. Mr. H. B. Gear, of the Chicago Edison Company, said that single phase motors of 1 to 5-horse power are being operated for general power work in large numbers in Chicago from lighting feeders. Such motors when started will often produce a dip of about 5 per cent. in the primary pressure; but as they are started usually not more than two or three times a day and at times when very little lighting is in use, there has been no difficulty with customers' complaints on account of these motors being on the same circuit. Motors of 1-horse power or larger are carried on separate transformers. In a few instances, installations of several 2-horse power motors aggregate 10 to 12-horse power. These motors have been found to affect the shape of the day load curve very noticeably. The Whitehall (Ills.) Electric Company reported that in the last three years it has installed seven of this type of motors, and is very well satisfied with the results. It has 2 of 25-horse power, 3 of 10-horse power, and 2 of 2-horse power. The two 25-horse power motors have particularly hard service; one is used to pump water from the city reservoir to a tank, being run after midnight, without attendance, and lifting 15,000 gallons 150 feet high through 6,000 feet of 6-inch pipe. The other is used to run a clay grinder in a pottery, and has to contend with a variation of from no load to 30-horse power every half hour, and also a change of 6-horse power in the load five times every two minutes. These motors are all run from a 60-kilowatt dynamo, and with one exception are all on the lighting feeders. The company has never had any trouble with the motors, and no complaints from its customers regarding the light furnished. The motors are in first class condition and there is no reason why they will not continue to give good service for years.

In reply to questions, Mr. B. A. Behrend said that any polyphase motor gives its output with less material than the single phase motor. You may consider a single phase motor as a 3-phase motor, one phase of which is cut out or interrupted. As to cost, there is a difference between cost and price. You have to compare shop cost and selling price on two entirely different bases. You may have to sell a 3-phase motor for about two-thirds of what you would have to sell a single phase motor. It is perfectly natural that a single phase motor should cost more than a 2-phase motor, because it contains more material. Mr. C. C. Badeau, of St. Louis, said that Wagner single phase motors sell for less than 2-phase motors. President Doherty added that the selling price is what the traffic will bear, and not what the apparatus actually cost. This is not always the case, but it is sometimes true.

Mr. Frank H. Taylor, of Pittsburg, said that the experience of central station people with alternating current motors is about the experience that he used to have as a salesman for Yale locks. There was no apparent reason why Yale locks should cost more than Corbin locks or the locks of any good manufacturer; but anyone who bought a Yale lock was never sorry he bought it and paid the price which it cost. The same thing is true of induction motors. The price is not excessive and anyone who buys one motor will buy more.

In reply to a query, "What system of charging best lends itself to the supply of power with induction motors?" Mr. W. J. Greene, of Cedar Rapids, Ia., favored a two rate system, in which allowance is made for the cost of increased investment in generator, transformer and wire capacity, due to the effect of the low power factor. Another opinion expressed was that a consumer should be charged for "readiness to serve," on basis of maximum demand of motor. The maximum demand should, in this case, be considered the demand which would blow a fuse of rated capacity, as distinguished from instantaneous demand.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

MR. HERMAN SCHEUCH has resigned from the service of the Utica (N. Y.) Gas and Electric Company.

THE Peoples Gas Light and Coke Company, of Chicago, has acquired title to the property on the northwest corner of Michigan avenue and Adams street, where its main offices have been located for some time. The Company also owns the plot adjoining on the north, and it is quite on the cards that both transactions mean the erection on the combined site of a mammoth business building.

THE proprietors of the Norwich (Conn.) Gas and Electric Company have applied to the Superior Court for the appointment of a commission to decide upon the value of its plants and the terms of the sale and transfer of its properties to the city, which some time ago elected to take over the properties for operation on municipal account.

FROM the returns made to the city officials, it is shown that the gas sold in Philadelphia by the United Gas Improvement Company for the quarter ended June 30, 1902, amounted to 1,224,122,000 cubic feet. For the corresponding quarter of 1901, the quantity sold was 1,090,600,300 cubic feet.

A CORRESPONDENT incloses the following: "At the annual meeting of the Easthampton (Mass.) Gas Company the officers elected were: Directors, H. L. Clark, George L. Manchester and C. H. Johnson; President, H. L. Clark; Secretary, Philip Mayher; Treasurer, George L. Manchester. A 3 per cent. semi-annual dividend was ordered paid. The reduction in the selling rate resulted in a satisfactory increase in output.

TO-DAY the shareholders of the Sherbrooke (Can.) Gas and Electric Company will consider the offer made by certain capitalists to take over the stock at the price of $78 per share.

NEW ORLEANS capitalists have made a bid for the gas, electric light and street railway interests of Natchez, Miss. Their purpose is to operate the named properties on joint account.

THE capital stock of the Coast Gas Company, which was formed for the purpose of supplying gas to Belmar and adjoining boroughs on the New Jersey shore, has been increased from $10,000 to $350,000.

MR. HENRY WARWICK, who is in charge of the plant of the the new Charleston (Ills.) Gas Company, reports that business has started in satisfactorily, and that applications for services are coming to hand in good number.

THE properties of the Charlotte (Mich.) Gas Company have been jointly purchased by Mr. J. H. Findlay, of Ogdensburg, N. Y, and Mr. W. P. Engel, of Defiance, O. The latter controls the properties of the Charlotte Electric Company.

THE proprietors of the Monterey (Cal.) Gas and Electric Company have purchased a controlling interest in the Monterey and Pacific Grove Street Railway Company.

MR. DAVID WESTWATER has purchased the interest heretofore held in the Ohio Mantel Company, of Columbus, O., by Mr. John H. Dubrow. The latter has also resigned the position of Manager to the Company.

THE property of the Harvey (Ills.) Water and Light Company, which was recently conveyed to the United Water and Light Company, has

been in turn conveyed by the latter to the Calumet Gas and Electric Company.

THE City Council of Kankakee, Ills., has granted a new franchise to the Citizens Gas Company, of that place. The life of the franchise was put at 20 years, the Company to have the right to a renewal of the grant for a like period from 1923. Under the agreement the following rate schedule was arranged: First 2 years of franchise; monthly consumption under 2,000 cubic feet, $1.45 per 1,000; over 2,000 cubic feet, $1.20. Next 3 years, under 2,000 cubic feet, $1.40; over 2,000 cubic feet, $1.15. Next 5 years, under 2,000 cubic feet, $1.25; over 2,000 cubic feet, $1.10. Last 10 years, under 2,000 cubic feet, $1.20; over 2,000 cubic feet, $1. Should the Company elect to renew the franchise in 1923, provision is made for a uniform flat rate of $1.

THE following is from Fall River, Mass.: "Some days ago a transaction was completed by which the controlling interest in the stock of the Fall River Gas Works Company was transferred by the United Gas Improvement Company, of Philadelphia, to Messrs. Lee, Higginson & Company, of Boston. The Philadelphia syndicate which bought the works several years ago came into possession of the Manufacturers Gas Company by purchase 6 years ago. The capital stock was increased then from $280,000 to $450,000. Recently the Company received permission from the Board of Gas and Electric Light Commissioners to increase the stock to $635,000, by the issuing of 1,850 new shares. The money is to be used for improvements now underway. The Company asked the Commissioners for permission to increase the stock $250,000, but the amount as voted was cut to $185,000, and the right was accepted. The negotiations for the transfer of the stock were conducted by Mr. Joseph E. Nute, who has managed the United Gas Company's interests in Fall River for several years. The complete reorganization of the executive staff by the new owners of the property will shortly take place."

MAYOR JOHNSON, of Cleveland, O., says that the ordinance under which the East Ohio Natural Gas Company is permitted to pipe the streets of Cleveland is not a perpetual one. "It is true," remarks the long-haired, obese "statesman," who at one time assisted in putting down in the city of Brooklyn, N. Y., the rottenest electric railroad system that ever was built, "that there was no time limit in the grant, but no such thing as a perpetual franchise is possible in Ohio. According to the constitution of '51 all franchises are subject to repeal or change by the legislature at any time. The recently granted natural gas franchise is the same in this respect as every other gas franchise in the State. It has, however, the additional safeguard of a municipal ownership clause. In my opinion a franchise of this nature is much safer and better in every way than one which gives an iron clad grant for a fixed number of years."

THE American Gas Engine Company, of Sheboygan Falls, Wis., has been incorporated by Messrs. J. W. Russell, F. W. Porter and Dewitt Jenkins. It is capitalized in $50,000.

THE authorities of Roanoke, Va., have granted the necessary permission for the construction and operation there of a gas plant of the Pintsch type. The plant is intended for the supply of gas to the passenger coaches of the Norfolk and Western Railroad system.

MR. H. G. LACEY has applied to the authorities of Hanford, Cal., for a 50-year franchise under which to operate a gas plant.

MR. GEORGE S. PORTER will construct a gas works at Prescott, Ariz., as soon as the required consent on such account from the authorities is obtained.

MR. FRANK M. PEET, Manager of the Federal Gas Company, of Columbus, O., is seeking the right to distribute natural gas in Mount Vernon, O.

THE residents of Modesto, Cal., are insisting that the moontable schedule now followed on street lighting account shall be changed to an all night and every night schedule.

THE village of Kenmore, a thriving village on the outskirts of Buffalo, is bargaining with the Buffalo Gas Company for an extension of mains to and through the streets of Kenmore.

THE proprietors of the Waynesboro (Pa.) Gas Company are considering the advisability of making a cheaper rate on gas sold for fuel account, and to allow a rebate to users of large quantities on illuminating account. Superintendent Stickell reports that 65 gas cooking stoves have been placed so far this summer.

MR. F. H. HAMBLETON, Chief Engineer of the Consolidated Gas Company, of Baltimore, Md., reports that the actual loss sustained by the overturning of a small storage holder on Scott street—it was destroyed during a severe electric storm that did considerable damage in Baltimore about a fortnight ago—will not exceed $2,500. He recommends that the holder be not rebuilt.

THE proprietors of the Bridgeport (Conn.) Gas Light Company have agreed to extend their mains to the outlying villages of Fairfield and Southport. Under the agreement the Company must have the gas supply laid on by July 1, 1903. It is, however, likely that Fairfield will have its gas service by Jan. 1, 1903.

SECTIONS 4, 5, 6 and 7 of the franchise under which the new gas plant at Monroe, Wis., is to be operated are as follows:

"Sec. 4. The price of gas furnished the citizens of Monroe shall not be more than $1.50 per 1,000 cubic feet where less than 5,000 cubic feet per month are used; $1.35 per 1,000 cubic feet where 5,000 cubic feet and less than 10,000 cubic feet per month are used; $1.25 where 10,000 cubic feet and more per month are used. All the above prices are subject to 7 per cent. discount if paid at the Company's office by the 10th day of each month, but this gas shall at all times be sold at prices not to exceed prices in neighboring towns of 8,000 to 10,000 population, notwithstanding the scale of prices designated in this aritcle. Any temporary contests between rival lighting companies for control shall not be regarded as determining said competition prices, however, but only normal conditions shall be regarded.

"Sec. 5. All city lighting shall be done by contract, and in no case shall the price exceed 90 cents per 1,000 cubic feet per month for all gas so used.

"Sec. 6. Said grantee or his successors shall commence the construction of said plant within 6 months and have the same in operation within 18 months from the date of acceptance of this ordinance, unavoidable delays excepted.

"Sec. 7. The said franchise shall remain in full force and effect for a period of 25 years from the date of acceptance. The said city of Monroe, through its Mayor, reserves the right of purchasing grantee's equity at the expiration of 15 years, at its then cash value; said value to be determined by appraisers, chosen as follows: The Mayor to appoint one man, the Gas Company one; in case the two cannot agree, they may call in the third man, and the price then agreed upon by a majority of said appraisers shall be binding upon said grantee and his successors."

THE properties of the Peoples Heat and Light Company, of Halifax, Nova Scotia, which were recently sold under foreclosure proceedings, have gone into the possession of the Halifax Tram Company.

AT the annual meeting of the Milford (Mass.) Gas Light Company, the following officers were elected: Directors, J. B. Bancroft, C. F. Claflin, L. H. Cook, B. E. Harris, J. E. Walker, G. A. Draper, N. B. Johnson, E. L. Wires, I. N. Davis and F. J. Dutcher; President, J. B. Bancroft; Treasurer, B. E. Harris; Secretary and Auditor, H. C. Tilden.

"M. C. T.," WRITING from Lowell, Mass., says: "I have not seen anything in the JOURNAL concerning the allowed grant for the building and operating of a gas works in Barre, Vt. The successful contestant was the one known as the Peoples Heating, Lighting and Power Company, which is backed by well-known residents of Barre. The Company had in its possession a charter from the State, but such could only become operative when the Barre authorities prescribed the necessary local franchise stipulations. This they have done, and it is understood that construction work will be started this fall. Although the franchise provisions are somewhat strict, in the main they should not work harm to the Company. Among other things it is provided that the Company shall pay into the city treasury 2 per cent. on its gross receipts each year; that its maximum selling rate shall not exceed $2 per 1,000 cubic feet, and that gas sold on public account shall be billed at $1 per

(*Continued on page 157.*)

THE AMERICAN GAS LIGHT JOURNAL

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PROPRIETORS.

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AGENTS:
New York—American News Co. 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, AUGUST 4, 1902.

(*Concluded from page* 156.)

1,000 cubic feet. It is also agreed that the city may purchase the plant at the end of 10 years for its then book value, plus 10 per cent. for the 'good will.'"

AT the annual meeting of the shareholders in the Beverly (Mass.) Gas and Electric Light Company the following officers were elected: Directors, Sidney W. Winslow, Andrew W. Rogers, S. W. Winslow, Jr., Charles F. Prichard and H. F. Winslow; President, S. W. Winslow.

THE City Light and Heat Company, of Fostoria, O., has resumed the distribution of gas in that city, owing to a suspension of the legal order declaring that it did not have the right to increase the selling rate to $1 per 1,000.

The Market for Gas Securities.

The local gas share market has evidently settled down to the usual spell of midsummer dullness. Trading in Consolidated gas was very much restricted, and the transactions were as a rule brought off at declining prices, although the shading in balance of values from day to day was marked in small fractions only. The net result for the week is a loss of one-half in the bid figure—223½, as against 224 last Friday. New Amsterdam 5's continue to increase in value. Mutual gas seldom makes its appearance on the market. This week a bid of 365 for 50 shares failed to bring out the stock. No wonder, either; for its book value is great.

Brooklyn Union shows no sign of weakening, although the approach of its marriage with its neighbor on the west side of the East river is still in theory only. Peoples, of Chicago, sustained a sharp fall, owing to the decision of Judge Grosscup in the matter of the 75-cent ordinance. Something more regarding this will be found in our current "Briefly Told" paragraphs. The case goes to the Supreme Court of the United States. Bay State is inert. Perhaps if Mr. Lawson's horse Boralma wins at Hartford to-morrow there may be a spurt in Bay State shares. Let us hope so. Baltimore Consolidated has once more crossed the 70 mark. In the possible excessive zeal of the new management many hope that they will not overlook the valuable services to the Company of Secretary Meginnis.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

AUGUST 4.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	223¼	224
Central Union, Bonds, 5's	3,000,000	1,000	110	112
Equitable Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	118	120
Metropolitan Bonds	658,000	.	108	112
Mutual	3,500,000	100	350	..
Municipal Bonds	750,000	..	..	..
New Amsterdam Gas Co.. Bonds, 5's	11,000,000	1,000	112¾	113
Northern Union, Bonds, 5's	1,250,000	1,000	108	110
New York and East River.. Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	.	109	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	
Standard	5,000,000	100	130	140
Preferred	5,000,000	100	150	160
Bonds, 1st Mortgage, 5's	1,500,000	1,000	114	117
Yonkers	299,820	500	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	235	241
" " Bonds (5's)	15 000,000	1,000	119	119½
Bay State	50,000,000	50	1¾	2
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	93	96
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000.000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	11	13
" " Bonds, 5's	5,250,000	1,000	83½	84½
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co..	20,500,000	100	102¼	102¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	108	109
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	88¾	89¼
Preferred	3,026,500	100	105½	109
Consumers, Jersey City Bonds	600,000	1,000	102	103
Consumers, Toronto	1,700,000	50	218	225
Consolidated, Baltimore	11,000,000	100	70	70¼
Mortgage, 6's	3,000,000	..	..	115
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,400 000			112
Consolidated Gas Co. of N.J.	1,000,000	100	15	17
" Con. Mtg. 5's	880,000	1,000	85	87
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	100
Detroit City Gas Co.	4,825,500	50		89
" Prior Lien 5's	5,603,000	1,000	99¼	100
Detroit Gas Co., 5's	851,000	1,000	77	79
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	34	38
Fort Wayne	2,000,000	..	.	
" Bonds	2,000,000	..	58	63
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	104¼	105
Hartford	750,000	25	245	265
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	70	80
" Bonds, 6's	2 650,000	..	102¼	104½
Jackson Gas Co.	250,000	50	73	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede, St. Louis	10,000,000	100	.	89
Preferred	2,500,000	100	..	110
Bonds	10,000.000	1,000	109¼	110
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	59	64
Louisville	2,570,000	50	122	123
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	107½	1 [illegible]
" 6 per cent. scrip, due 1910	100,000	25	25	87
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	56	58
Bonds, 6's	4,600,000	.	105	105¾
New Haven	1,000,000	25	300	325
Nashville Gas Lt. Co.	1,000,000	100	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	103⅝	103⅞
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co..	2,150,000	50	88	.
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000		87½	90
San Francisco, Cal.	10,000,000	100	48	48½
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgage 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	92	94
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	95	96½
Syracuse, N. Y.	1,975,000	100	24½	28
Bonds	2,047 000	1,000	86	90
Washington, D. C	2,000,000	20	345	350
First mortgage 6's	600,000	..	..	..
Western, Milwaukee. Bonds, 5's	4,000,000	..	109¼	110
Wilmington, Del.	600,000	50	232	

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POSITION WANTED AS MANAGER,

By a hustler for new business. Has experience in selling gas stoves; also in laying high and low pressure mains. Understands the manufacture of coal and water gas in detail. Experience in reconstruction of benches and water gas apparatus. Was superintendent of gas works for number of years. Now in charge of new business department of one of the largest gas companies in the Union. Will furnish all required references. Address, "G. L.,"

1414-4 Care this Journal.

Position Wanted.

YOUNG MAN, 32, eight years' continuous experience in all branches, desires position of superintendent or manager of coal gas plant. References.

1415-3 Address, "WANT," care this Journal.

WANTED,

BY a Gas Company making about 500,000 cubic feet of gas daily, a licensed engineer, with knowledge of water gas manufacture, to act as foreman gas maker. Steady work and good pay for the right man.

1417 2 Address, "X.," care this Journal.

WANTED,

A YOUNG MARRIED MAN, to take charge of manufacture and distribution for a gas company near New York city. Address, stating age, experience and salary expected, "WATER GAS."

1417-2 Care this Journal.

WANTED,

To Buy or Lease a Gas or Gas and Electric Plant,

In city of 8,000, or over.

14 7-5 Address, "E. B.," care this Journal.

WANTED,

Second-hand Station Meter, from 60 to 72 inches diameter.

Four Purifying Boxes, 9 feet by 12 feet, or about that capacity.

1416-tf Address, G. M. ROSSMAN, Treas., Keene, N. H.

GAS ENGINES FOR SALE.

Having made a change in our plant, we offer for sale

THREE OTTO GAS ENGINES,

of 50-horse power each; also, one starter. All in good condition. For terms, apply to

WILLIMANTIC GAS AND ELECTRIC LIGHT CO.,
1405-3m Willimantic, Conn.

FOR SALE,

Five-foot Water Gas Apparatus,

Consisting of generator, carburetor, superheater, seal, scrubber, condenser; two (2) 15-horse power engines; two (2) blowers, wall brackets, countershaft, belting, etc.

Apply to CHARLES THOMAS,
1415-tf MAIN ST., FLU HING, N. Y.

FOR SALE.

Apparatus for Complete Water Gas Plant,

Consisting of 5-ft. cupolas; purifying boxes, with center seal; engine, boiler, blower and holder.

Address, "P. R. R.,"
1403-tf Care this Journal.

IN THE MARKET.

WE PURCHASE:

Gas properties,
Electric light properties.
Street railway properties.
Also desirable franchises.

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1383-tf 317 St. Claire Street, Toledo, O.

INVENTIONS FOR EUROPE.

Engineers of standing and acquaintance in Europe are desirous of securing the handling of some good inventions abroad. We want such as will justify the organization of companies. Liberal propositions for the right articles.

ZERBE & ZERBE, Engineers,
1345-tf 11 Broadway, New York.

Utilize Your Gas Liquor.

NO EXTRA LABOR OR OPERATING EXPENSES.

Ammonia Concentrator.

Not Expensive. Write to

STROH & OSIUS, Pat'ees, or
Mich. Ammonia Works, Detroit, Mich.

"THE MINER"

Globe Street and Boulevard Lamps.

Cheapest and Best.

THOUSANDS IN USE WITH INCANDESCENT BURNERS.

Send for Catalogues.

THOMAS T. W. MINER

821-823 Eagle Av., N. Y.

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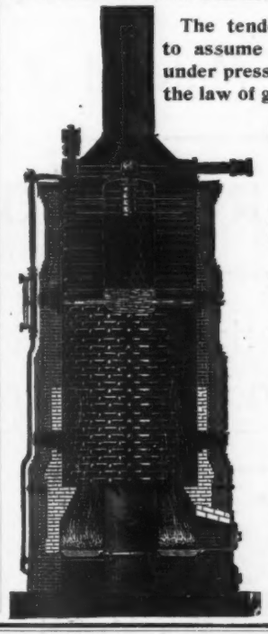


The tendency of a boiler to assume cylindrical form under pressure is as sure as the law of gravitation.

HAZELTON WATER TUBE BOILERS

are cylindrical and are stronger than boilers of any other form. They have no flat surfaces held by dangerous stay bolts, which are reduced in strength when heated.

YOU BUY SAFETY when you buy a

HAZELTON.

Correspondence Solicited.

THE HAZELTON BOILER CO.,

Tele., 6M Rutherford.

Main Office and Works: Rutherford, N. J., U.S.A.

Cable Address: "Paila," Rutherford.

GAS BURNERS,

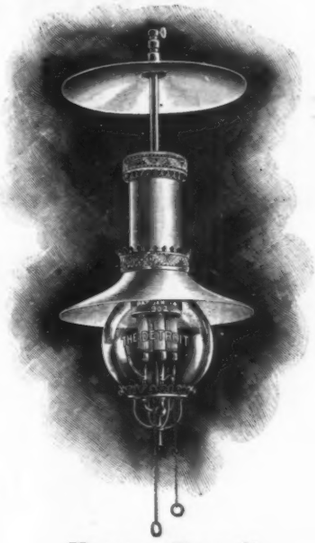
To burn a given amount at a stated pressure, made to order. Samples furnished. Also, small oil and air valves, slow-feed valves for high pressure, and small brasswork in general.

Drip Pumps, Service Cleaners, Gasfitters' Proving Pumps and Mercury Gauges.

C. GEFRORER & SON.

218 North 8th Street, Philadelphia, Pa.

The DETROIT



Force Draft

ARC GAS LAMP.

Durability,
Efficiency,
Simplicity,
Economy.

Perfect Combustion.
No Chimneys to Break.
No Matches Necessary.
Consumes Less Gas.
A Handsome Fixture
Always in Order.

Our lamp gives 25 per cent. ***more light*** with 20 per cent. ***less gas*** than any Arc Gas Lamp now on the market.

TO LIGHT CONSUMPTION WHAT THE GAS RANGE IS TO FUEL. : : : : :

SAMPLE ORDERS *Solicited*

Manufactured by

The Detroit Arc Gas Light Co.,
67 to 71 Michigan Avenue,
DETROIT, MICH.

Chollar's System of Gas Purification.

THE PURIFIED GAS REVIVES THE FOULED OXIDE.

LAVA GAS TIPS

We offer inducements on the best American E. H. Lava Tips in the way of price, superior workmanship and immediate delivery.

SAMPLES FREE. SMALL ORDERS SOLICITED. CORRESPONDENCE INVITED.

SUNLIGHT LAVA MFG. CO., CHATTANOOGA, TENN.

Send for comparative test.

LAVITE
(TRADE MARK)
Center-Supports.
BEST MATERIAL. : : : : : : ACCURATELY MADE.

Lessens vibrations.
Never bends.

THE D. M. STEWARD MFG. CO., ESTABLISHED 1876.

NEW YORK: 107 Chambers Street. CHICAGO: 57 Washington Street. FACTORY AND GENERAL OFFICE: Chattanooga, Tenn. 3

CHRISTOPHER GUNNINGHAM,

PROPRIETOR,

THE NOVELTY STEAM BOILER WORKS,

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STORAGE TANKS FOR GAS WORKS,

To Retain Fluid Material of Any Sort.

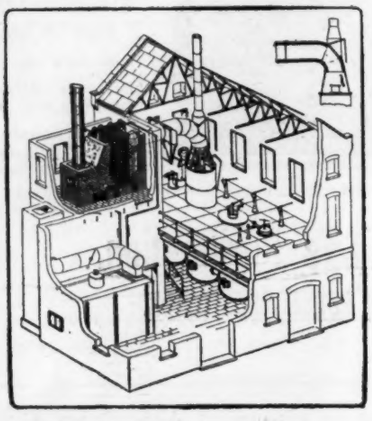
PIPING IN AND AROUND GAS WORKS.

Work Done for Several of the Largest Gas Companies in America Stands as Reference.

Economize Heat in Water Gas Plants,

BY UTILIZING A

Green's Economizer,



To absorb the heat now going to waste when you blow through your superheater to heat the feed water for your boilers to the temperature of the steam. This is now being done at the Poughkeepsie Gas Works, Poughkeepsie, N. Y. : : : : :

Write for full particulars how this is accomplished, the saving effected, and the advantages gained, to the

GREEN FUEL ECONOMIZER CO.,
MATTEAWAN, N. Y.

Newbigging's Handbook for Gas Engineers and Managers.

By THOMAS NEWBIGGING, M. Inst. C. E.

PRICE $6. - For sale by **A. M. CALLENDER & CO., 42 Pine St., New York.**

BRAY'S NEW BURNER
"LUTA,"

For Acetylene Gas.
Superior to all others.
Send for "Blue Book" about
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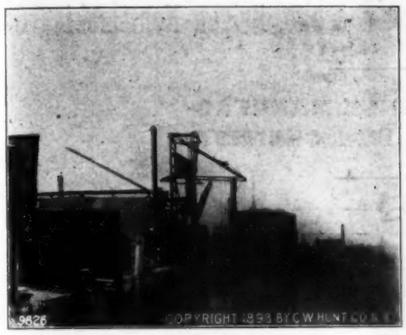
SOLE AGENTS FOR UNITED STATES,
1131-1133 Broadway, New York.



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Newark Gas Light Company, Newark, N. J.

WE MAKE

Coal Hoppers, Chutes, Valves and Spouts

in great variety. Materials and workmanship are thoroughly good. We have been in our special line of business 30 years, and our coal handling machinery is in use in almost every port in America. We design all classes of storage buildings for storing coal.

We invite your Correspondence.

THE C. W. HUNT CO.,
West New Brighton, Staten Island, N. Y.

THIS IS THE

HUMPHREY GAS ARC LIGHT,

The Best Light in the World

FOR LIGHTING

Stores, Churches, Halls or any large indoor areas.

Guaranteed to give a greater volume of light, better diffused and steadier than an electric arc.

A Complete Revolution in Gas Lighting.

A sample lamp sent on 30 days' trial to any Gas Company.

This lamp is thoroughly protected with both Mechanical and Design Patents. Imitation of this Design and Construction will be prosecuted.

Manufactured by the
General Gas Light Co.,
KALAMAZOO, MICH.

MUELLER TAPPING MACHINES.

B—109.

WHEN you indorse a note or other commercial instrument it means that you stand behind it until the implied obligation is discharged.

The unconditional guarantee of **Mueller Gas Main Tapping Machines** means that we stake our word and responsibility on their capacity for doing accurate, rapid work.

Five styles, ⅜ to 3-inch tap, any size main.

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H. MUELLER MFC. CO.,
DECATUR, ILLS., U. S. A.

THE
Ludlow Valve Mfg. Co.,
TROY, N. Y., U. S. A.
Double and Single Gate Valves, ¼" to 72",
—FOR—
Gas, Water, Steam, Oil, Ammonia, Etc.

HOT GAS VALVES A SPECIALTY.

Send for Catalogue.

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Coal and Water Gas Plants.

OWN SYSTEM.

RECUPERATIVE FURNACES, WASHERS, CONDENSERS, PURIFIERS, PURIFYING MACHINES, COKE CONVEYERS, ETC.

SOLE UNITED STATES AGENT FOR

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Gas Enriching Plants to Enrich Coal Gas up to 24 Candle Power, and Making a White, Bright, Non-smoking Gas.

GAS RETORTS AND SPECIAL BLOCKS AND FIREBRICK MANUFACTURED UNDER THE SUPERINTENDENCE OF MY OWN CHEMIST.

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MANUFACTURERS AND CONSTRUCTORS
OF GAS APPARATUS AND PLANTS.

"ON DECK"

in our **new factory,** with a complete line of **new machinery** of the latest designs and a complete line of **new patterns,** embodying the most approved construction of **Coal Gas** and **Lowe Water Gas Apparatus, Purifiers, Etc.**

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Plans prepared and Estimates furnished at short notice.

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GEORGE R. ROWLAND,

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Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.

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MR. T. VINER CLARKE, of London, England, having compiled a novel Chart or Map illustrating the various

CHEMICAL PRODUCTS DERIVED FROM COAL AND COAL TAR,

In the form of a Genealogical Tree, including all the products discovered to date, the total number amounting to near 700, offers for sale a limited number of copies in Colors, mounted on Linen, with Rollers. Price, 3.50. Orders may be sent to

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No. 42 Pine Street, New York City.

The Advertisement of the

CONNELLY IRON SPONGE AND GOVERNOR COMPANY,

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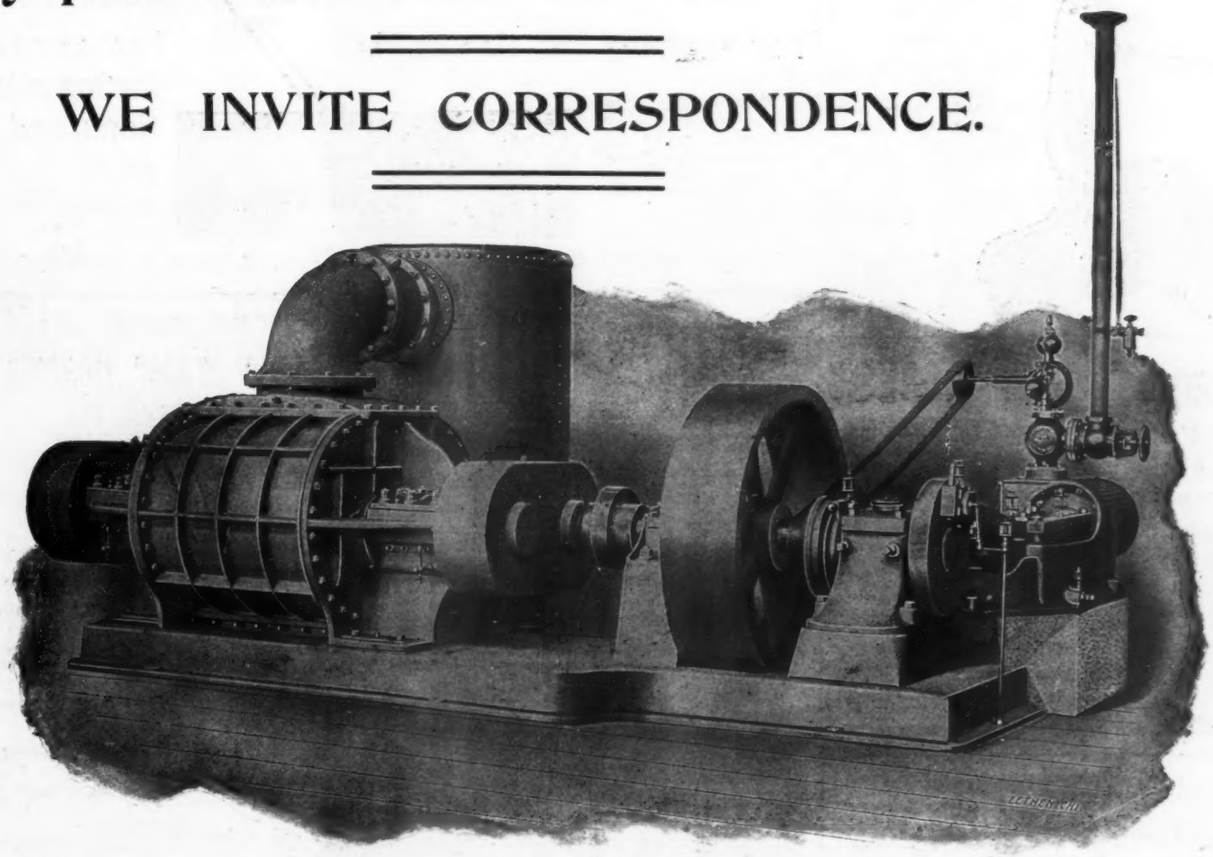
Occupies this Space Every Alternate Week.

ROOTS'

HORIZONTAL GAS EXHAUSTER.

WE are building a line of Exhausters as per cut herewith, for forcing gas long distances and under pressures that are higher than ordinary pressures.

WE INVITE CORRESPONDENCE.



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MANUFACTURERS OF
CAST IRON PIPE AND SPECIAL CASTINGS
FOR WATER AND GAS.
Also, FLANGE PIPE, LAMP POSTS, Etc.

GAS TAPPING MACHINES
—FOR—
Drilling and Tapping Pipe under Pressure
WITHOUT ANY ESCAPE OF GAS.
They are Strong and Compact.
Size of Combination Drills and Taps ¾ to 4-inch.
Machines Sent to any Gas Company for Thirty Days' Trial.
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Hughes' "GAS WORKS,"
Their Construction and Arrangement,
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Originally written by SAM'L HUGHES, C.E.
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THE
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FOR ASSESSMENT PURPOSES.
SECOND EDITION.
THOS. NEWBIGGING, M.Inst.C.E., and WM. NEWBIGGING, Assoc.M.Inst.C.E.
With an Appendix of Decided Cases.
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Established 1856. Works at Phillipsburgh, N. J.
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CAST IRON WATER AND GAS PIPE,
FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF
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Manufacturers of Lead Pipe, Solder, etc., and Jobbers of Plumbers' and Tinners' Goods.
CAST IRON PIPE and SPECIALS FOR WATER AND GAS.
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SAFETY GAS MAIN STOPPER COMPANY,
For Shutting Off Gas in Mains
Any size gas main can be shut off in 30 seconds. : : :
GOODMAN STOPPER
Temporarily during alterations and repairs. : : : :
STOPPERS SENT ON TRIAL.
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MOST GAS COMPANIES DO SELL, EVERY GAS COMPANY SHOULD SELL
Humphrey Crescent Instantaneous Water Heaters,
A LUXURY and NECESSITY.
This is Our No 2 Heater.
Supplies hot water for domestic use as well as for the bath.
It Has No Equal
LIST PRICE NICKEL PLATED, $35.00,
including nickel plated shelf and brackets.
We have many styles, which range in price from our No. 10, at $45.00, to our No. 8, at only $20.00.
Every Heater Guaranteed.
SEND FOR CATALOGUE AND PRICES.
Will send heater on 60 days' trial to any Gas Company.
The Humphrey Manufacturing and Plating Company, KALAMAZOO, MICH., U.S.A.

THE GAS ENGINEERS' POCKET-BOOK, By Henry O'Connor.
Comprising Tables, Notes and Memoranda relating to the Manufacture, Distribution and Use of Coal Gas, and the Construction of Gas Works. PRICE, $3.50.
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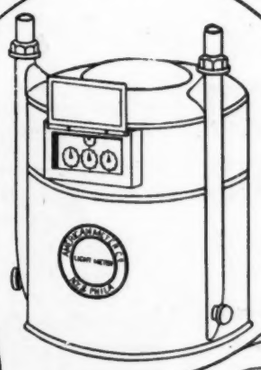
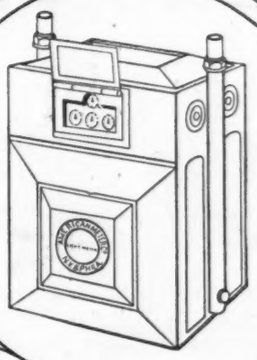
CHICAGO, ST. LOUIS,

SAN FRANCISCO.

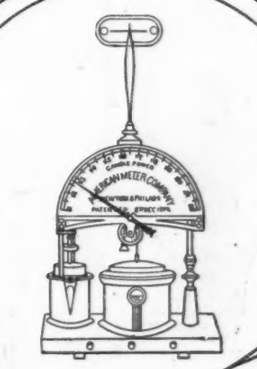


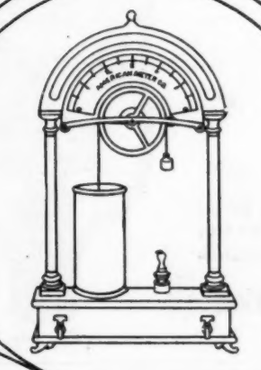


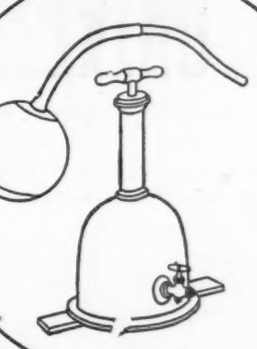
PUBLIC LIGHTING TABLE.

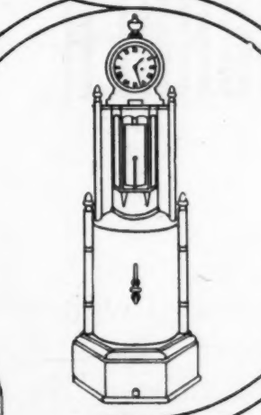
AUGUST, 1902.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Fri.	1	7.50 PM	4.00 AM	7.10	3.30
Sat.	2	7.50	4.00	7.10	3.30
Sun.	3	7.40 NM	4.00	7.10	3.30
Mon.	4	7.40	4.00	7.10	3.30
Tue.	5	7.40	4.00	7.10	3.30
Wed.	6	7.40	4.00	7.10	3.45
Thu.	7	7.40	4.00	7.10	3.45
Fri.	8	8.40	4.00	7.10	3.45
Sat.	9	9 20	4.00	7.10	3.45
Sun.	10	9.50 FQ	4.10	7.10	3.45
Mon.	11	10.30	4.10	7.10	3.45
Tue.	12	11.10	4.10	7.10	3.45
Wed.	13	12.00	4.10	6.55	4.00
Thu.	14	12.50 AM	4.10	6.55	4.00
Fri.	15	1.40	4.10	6.55	4.00
Sat.	16	2.40	4.10	6.55	4.00
Sun.	17	No L.	No L.	6.55	4.00
Mon.	18	No L. FM	No L.	6.55	4 00
Tue.	19	No L.	No L.	6.55	4.00
Wed.	20	7.20 PM	8.20 PM	6.45	4.10
Thu.	21	7.20	8.50	6.45	4.10
Fri.	22	7.20	9.30	6.45	4.10
Sat.	23	7.20	10.00	6.45	4.10
Sun.	24	7.10	10.40	6.45	4.10
Mon.	25	7.10 LQ	11.30	6 45	4.10
Tue.	26	7.10	12.20 AM	6 45	4.10
Wed.	27	7.10	1.20	6.30	4.20
Thu.	28	7.10	2.20	6.30	4.20
Fri.	29	7.10	4.20	6.30	4.20
Sat.	30	7.10	4.20	6.30	4.20
Sun.	31	7.00	4.30	6 30	4.20



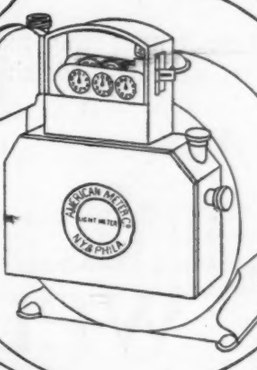


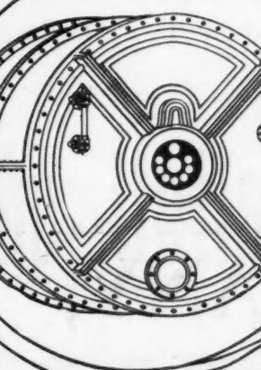




TOTAL HOURS LIGHTING DURING 1902.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	238.30	January	423.20
February	196.20	February	355.25
March	196.20	March	355.35
April	166.40	April	298.50
May	151.40	May	264.50
June	131.10	June	234.25
July	142.40	July	243.45
August	162.00	August	280 25
September	179.00	September	321.15
October	216.30	October	374.30
November	224.10	November	401.40
December	250.00	December	433.45
Total, yr.	2255.00	Total, yr.	3987.45

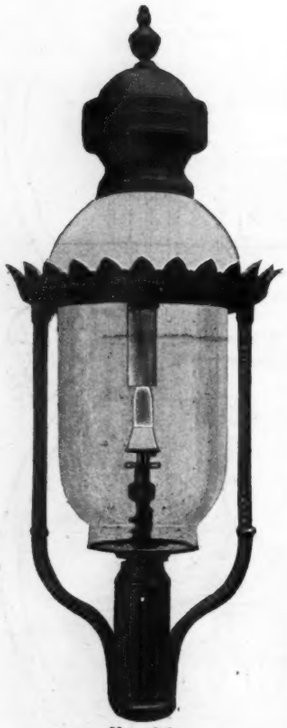




NEW YORK, 33 Nassau Street. PHILADELPHIA, Broad and Arch Streets. CHICAGO, Foot of Orleans Street. BOSTON, 624 Tremont Building.
CLEVELAND, 809 Cuyahoga Building. ST. LOUIS, 712 Roe Building. SAN FRANCISCO, 712 Polk Street.

WELSBACH STREET LIGHTING COMPANY

.... OF AMERICA ....



No. 36.

Controls and Operates the

Welsbach System of Street Lighting,

Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in 150 Cities and Towns.

By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

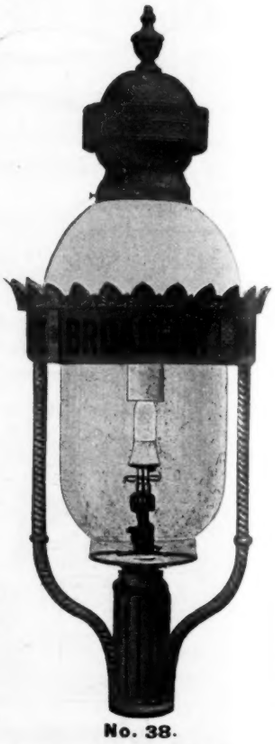
POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.

Correspondence Solicited from Gas Companies and Others Interested in Municipal and Outside Lighting.



No. 38.

UNIVERSAL WELSBACH BURNER.

The most practical, efficient and artistic burner yet produced. . . . . .

It contains an improved adjustable Bunsen so constructed as to permit of a wide range of variations in gas pressure without blackening the mantles and without an adjustable air shutter. . .

It can be used with all styles and sizes of glassware, either shades or globes. No further necessity to carry a stock of different burners for the many sizes and shapes of glassware.

GAS COMPANIES AND DEALERS CANNOT FAIL TO APPRECIATE THE MANY SALABLE FEATURES OF THIS NEW BURNER.

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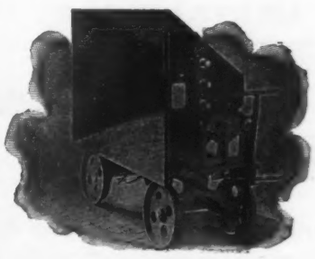

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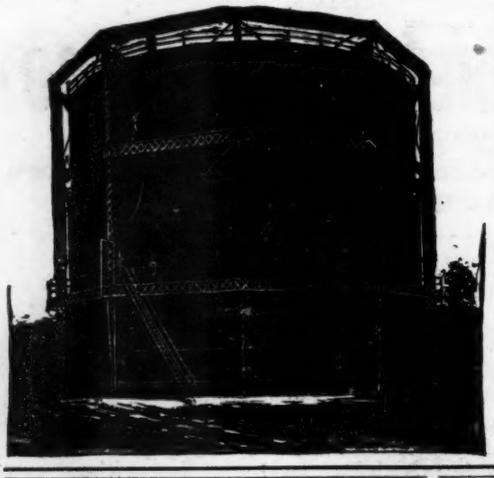

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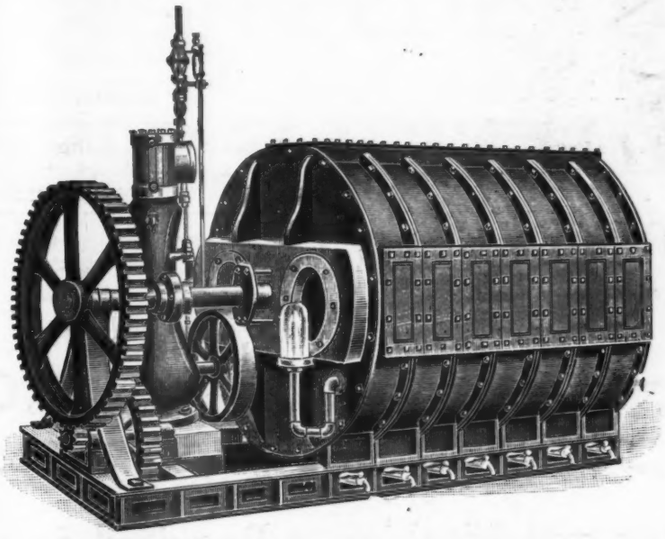

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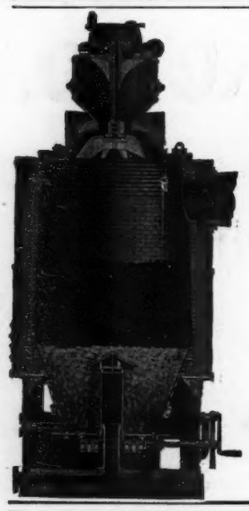

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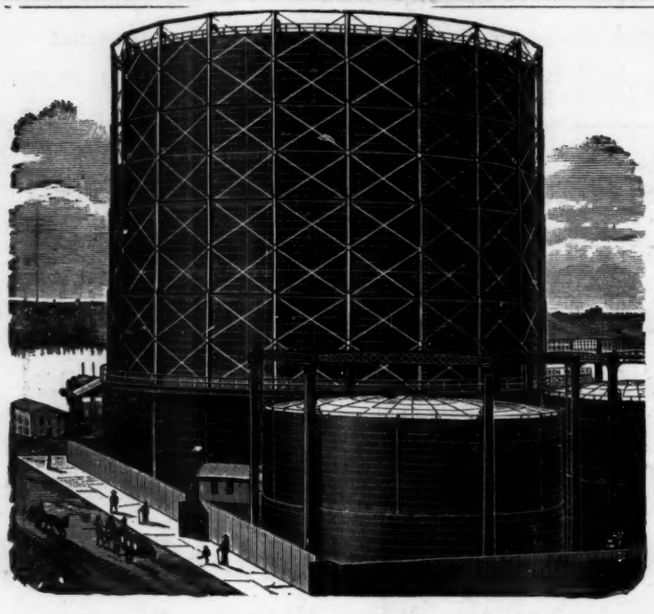

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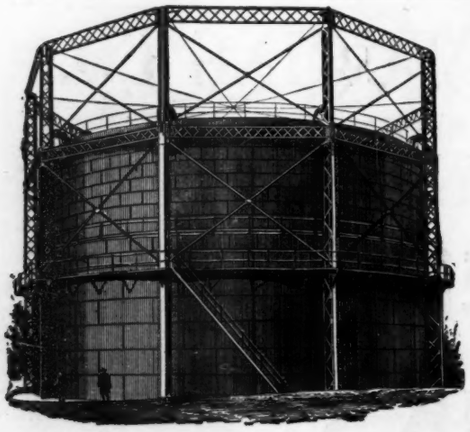

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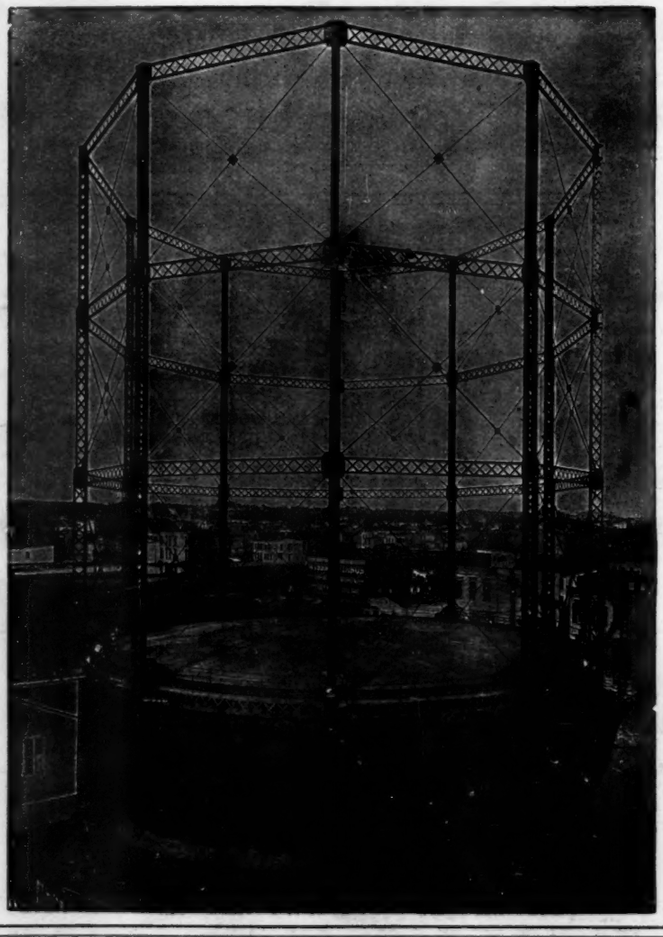

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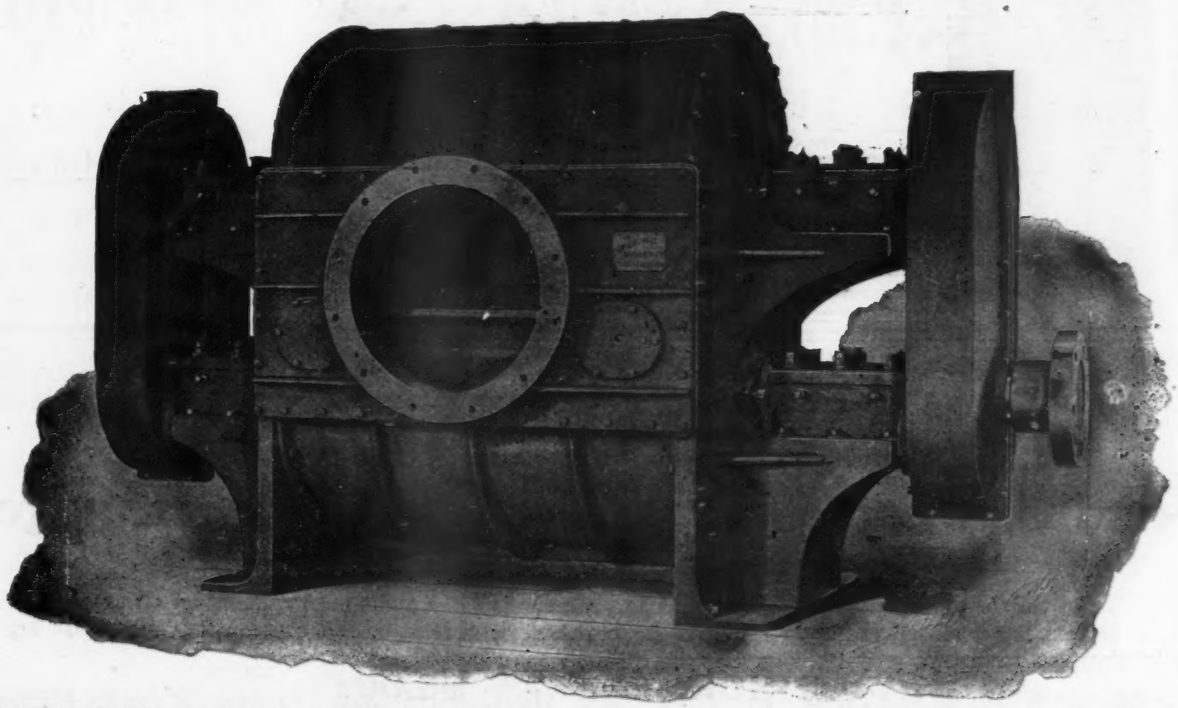

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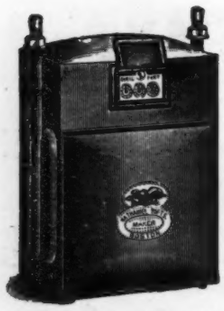

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